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ABSTRACT

The purpose of this study was to identify effective and ineffective strategies for teaching Title I students. The data collection took the form of direct observations of teacher-student interactions and classroom activities in the classes of 79 Oklahoma City Public Schools Title I teachers. The data on achievement gains came from the California Achievement Test administered in May 1981 and May 1982. The results for reading indicated that, across all grade-levels, the teachers who allocated more time for academic activities and who interacted more with their students tended to have students with higher achievement gains. The teachers whose students had higher gains also tended to rely more on one-to-one interactions, used some challenge in the lesson content, used opinion questions and "higher order" questions, and used feedback strategies that sustained the interaction. Although some of the results for math agreed with the reading findings, there were also some notable differences. In general, the profile of the effective math teacher was more characterized by public interactions and by faster-paced activity than in reading. Small group activity was positively associated with gain, and, as in reading, sustaining feedback was a better strategy than redirecting a question to another child. (BW)

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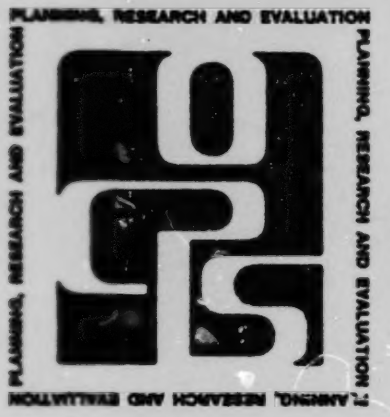
A STUDY OF INSTRUCTIONAL PROCESSES IN TITLE I CLASSES

EXECUTIVE SUMMARY



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A Study of Instructional Process in Title I Classes

Executive Summary

Introduction

This report describes the methods and gives the results of a large-scale study of Title I (now "Chapter I") classroom instruction. The purpose of the study was to identify effective and ineffective strategies for teaching Title I students. Once those strategies are identified, it becomes possible to facilitate program improvement by making recommendations to teachers concerning which teaching behaviors are associated with student achievement gains.

The data collection took the form of direct observations of teacher-student interactions and classroom activities in the classes of 79 Oklahoma City Public Schools (OCPS) Title I teachers. Title I is a compensatory program that is federally-funded for the purpose of remediating weaknesses in the basic skills of reading and math. In OCPS, the program is designed to provide individual attention to lower achieving students through small class sizes, the use of paraprofessional teacher aides, and a wide variety of materials. Over the years, the evaluation of the program has typically focused on achievement gains -- that is, the studies have been "product" evaluations of the degree to which the program has met its stated objectives. In

accordance with published guidelines, the objectives state that a majority of the students receiving services will "gain ground" in relation to national norms. This study is a "process" or "formative" evaluation effort which is concerned with the precise nature of program implementation and the relationships between measures of implementation and student academic growth. If evaluation findings are truly to be used for program improvement, a study of this type should be more fruitful than a descriptive analysis of end-of-year achievement gains.

Method

Valid data were collected in a total of 337 observations in the classrooms of the 79 participating teachers. The grade levels of the students observed ranged from first through eighth. The teachers who were observed consisted of virtually the entire population of OCPS Title I teachers (the only ones not included were those who were part-time in one school and part-time in another or who were teaching in private schools or in special centers).

The instruments used in the data collection were adapted from those used in other studies of teaching effectiveness (all measures are defined in the full technical report). The types of measures fell into three broad categories: (1) time use or time allocation measures, (2) global or "high inference" (5-point) rating scales, and (3) "low inference" measures of teacher-student interactions.

The time use or time allocation instrument recorded the

number of minutes allocated to different instructional activities and different student grouping patterns; a new entry was made whenever a transition occurred. The "high inference" rating scales used observer judgment in assigning rating to global aspects of the classroom environment (like overall student attentiveness and the "momentum" or continuity of the lesson). The "low inference" instrument was an adapted version of the teacher-student interaction instrument used by Brophy and Evertson (1976) and others in prior research on teaching; frequencies of teacher and student behaviors in several contexts (for example, public vs. private, teacher vs. student initiated) were recorded. In most analyses, data from observations of reading instruction were analyzed separately from the observations of math instruction. To the greatest extent possible, the observations were balanced across subject matter areas, time of day, and day of the week. Interested readers are referred to the full technical report for a complete description of observational procedures and instruments.

Some of the major analyses involved correlating the "process" measures of classroom activities with student achievement gains. The data on achievement gains came from the California Achievement Test (CAT). The "pretest" data in these analyses are from the May, 1981, district-wide CAT administration and the "posttest" data are from the May, 1982, testing occasion (to correspond to our process measures which were from the 1981-82

academic year). The "total reading" and "total math" scores were analyzed. The metric used was the Normal Curve Equivalent (NCE), which is an equal-interval measure of a student's standing in relation to the national normative sample. Like the observational data, the achievement gains were aggregated to the teacher level; this procedure permits correlational analyses (with N equal to the number of teachers or classes) for the purpose of determining linkages between the teachers' instructional strategies and their students' academic growth.

Achievement gains using NCE scores were calculated two ways: (1) raw NCE gains were obtained by simply subtracting the post-score from the pre-score, and (2) a regression-adjusted gain was calculated to remove the effect of the pre-score. Conceptually, the raw gain and the regression-adjusted gain are both measures of student growth. The regression-adjusted gain was computed because it offers certain statistical advantages over the raw gain measure. Our analyses have shown that the raw gain is related to pretest in such a manner that high gains tend to be associated with low pre-scores, and vice-versa. That is, the raw gain only appears to "account for" or "control for" student's initial achievement level; in actuality, it does not remove the influence of pre-scores. The regression-adjusted gain, however, guarantees that the gain score will not be related to pretest performance ("guarantees" by virtue of the manner in which the regression procedure operates). While the regression-adjusted

gain may be preferable for these statistical reasons, it is not really independent of the raw gain -- that is, the two kinds of gain are positively related to each other. A teacher who has students with a high raw gain will also probably tend to have a relatively high regression-adjusted gain. When analyzing the correlations between instructional processes and achievement gains, we used both kinds of gain scores.

Results

In the full technical report, there are sections of the results devoted to describing differences in instruction and student behavior between grade-levels and between subject-matter areas. Those findings are important as "status quo" measures of the Title I instructional process -- they would be useful in developing recommendations for teachers that specify exactly "how much" (or how little) a particular instructional technique ought to be used. Those results, as well as the correlations among process variables (which address the internal consistency of the observational measures), will not be discussed in this short executive summary, so that we can focus on the correlations of process variables with achievement gains.

The relationships between teaching strategies and student academic growth constitute the research basis for identifying effective and ineffective methods in Title I instruction, and therefore may be said to have the most "applied" value of any of the results. The process-product relationships are discussed

separately for reading and math, first for the overall sample (first through eighth grades), and then for elementary grades only (first through fourth) and upper grades only (fifth through eighth).

Reading

The results for reading indicated that, across all grade-levels, the teachers who allocated more time for academic activities and who interacted more with their students tended to have students with higher achievement gains. The teachers whose students had the higher gains also tended to rely more on private, one-to-one interactions (especially in the early grades, and, to some degree, in the overall sample). Effective teachers also made use of some challenge in the lesson content. Effective teachers used: opinion questions, "higher order" questions that require student comprehension and analysis, and feedback strategies that sustained the interaction (instead of strategies that terminate the interaction, such as re-directing a question to another student when the first student answers incorrectly). The teachers who had the highest gaining students also used praise sparingly, in recognition of only truly superior work. And, they occasionally directed mild criticism (for example, "you can do better than that!") at a student's work as a means of communicating higher expectations; in those classes, relatively high achievement gains were observed.

In the analyses of elementary grade (first-fourth) classes,

the importance of individualized, one-to-one contacts was even more apparent than in the analyses of all grades. In fact, the results gave some indication that the elementary grade data were primarily "responsible" for the correlations between private interactions and reading gains that were observed in the total sample. The total time and total number of academic minutes were positive predictors of gain, as was the proportion of all public, student-initiated interactions that were questions. When a student misbehavior occurred, the more effective teachers used "mild desists" rather than warnings or stronger corrective actions. The elementary grade teachers with the highest gains also made use of more difficult seatwork (and monitored student progress on that seatwork vigilantly) and asked more opinion questions than teachers whose students made lower gains.

In the upper grades (fifth year and middle school), the profile of the effective reading teacher was primarily defined by measures of classroom management: teachers whose students had the highest gains were those who typically prevented behavior problems by their awareness of student behaviors and communication of that awareness to students. The effective teachers also had smoothly running lessons with few interruptions and few "slowdowns". The effective upper grade teachers were observed asking academic questions publicly, with less emphasis on private one-to-one contacts than in the early grades. Indeed, the more effective upper-grade reading teachers were observed distributing

their time equally across students, instead of spending extended amounts of time with one or two students at a time. Those results suggest the possibility of a developmentally-related need, whereby the elementary grade students apparently profit more than middle school students from private, one-to-one interactions. As in the elementary grade analyses, results indicated that the teachers with the highest gains made some use of work-related criticism to communicate high expectations to the students. The findings for the upper grades also showed that some use of private, social teacher-initiated contacts was associated with higher gains; the effective upper grade teachers were concerned about building and maintaining rapport, in addition to their concern about concentrating on academic basic skills.

Math

Although some of the results for math agreed with the reading findings, there were also some notable differences. In general, the profile of the effective math teacher was more characterized by public interactions and by faster-paced activity than in reading. Small group activity was positively associated with gain, as was the rate of public teacher or student-initiated contacts. When effective teachers in math did make use of private interactions, they tended to be brief, allowing the teacher to spread his or her time equally across all students, instead of spending extended periods with one or two students at a time. In the math results across all grades (as was found in reading),

sustaining feedback was found to be a better strategy than re-directing a question to another child. The findings for math also showed that praise was best used sparingly, and that some degree of chalienge or difficulty in the lesson was better than having lesson content be so easy that no student errors in responding occurred.

In the elementary grade analyses in math, effective teachers kept interruptions to a minimum and spent very little time in transitions from one activity to another. The elementary teachers with the highest math gains had high rates of academic interactions and did not engage students in large numbers of procedural or social interactions. These results also showed that student-initiated, public interactions were associated with higher gains, and that some degree of difficulty or chailenge in the lesson content was related to higher gains. In agreement with the reading results, the math data also showed that the effective teachers sustained interactions with students who answered incorrectly, said "I don't know", or made no response. Those teachers with the higher gains also tended to avoid very lengthy child-initiated private contacts, in keeping with the idea that, for math, the use of fast-paced activities relates to higher gains.

In the upper grade analyses (fifth to eighth grades) for math, we find many of the earlier-discussed findings being supported -- such as the effectiveness of more academic allocated time. No

particular grouping pattern (individualized vs. small group vs. whole group) was found to be more effective than any other. The findings from the measures of praise showed an interesting pattern in these upper-grade math results. The overall amount of praise was negatively related to gains, as was found in other contexts. However, the use of praise following a public student-initiated question or comment tended to be positively associated with gains. It appears that the more effective teachers in these grades (in math) made use of praise to encourage student initiative and involvement in the lesson.

Implications of Results

The findings of this study have many implications for the improvement of the instructional process in Chapter I classes. Each of the results showing relationships between a teaching strategy and student achievement gains could be developed into a recommendation for increasing the learning gains of Chapter I students.

Across grade-levels and subject-matter areas, we found that the teachers whose students had the highest gains were those who:

- Had high rates of interactions with their students
- Allocated a high percentage of the available time to academic activities
- Monitored student progress (in seatwork as well as in public discussions) effectively and vigilantly
- Minimized interruptions and spent little time in transitions

In addition to the results for all grades and both subject matter areas, many findings were significant for only one grade-level, or for reading or math, but not both. Generally, the findings suggested that individual, one-to-one interactions were more important (that is, more effective in producing gains) in the elementary grades than in the upper grades and in reading instead of in math. We have speculated that there may be greater "payoff" from truly individualized instruction in the early grades because younger students are not ready cognitively or maturationally for the additional requirements of effective group work (in public).

Similarly, the private interaction strategies may be more important in reading than in math because of the fundamental differences between learning to read and learning to compute. The phenomenon of learning to read has so many different subprocesses that are required that two children operating at the same general level of difficulty could be experiencing dramatically different problems in learning to read. Such a situation would imply that individualization would be necessary for maximal learning to occur. In math, the information-processing required of the students is much more so an unvarying set of rules ("algorithms" in the technical sense), and therefore one might expect that individual, private contacts would be less crucial (than in reading) as a prerequisite for an optimal teaching/learning situation to occur.

We did find evidence that fast-paced lessons with maximum content coverage were effective in math. Effective math instruction was also characterized by use of "small group" activity, where the small group was defined as more than one student together, but fewer than the number of all students present, working on the same content. Math teachers with high achieving students were also observed spreading their time equally across students, instead of contacting a few students for extended periods.

In the upper grades, in reading, evidence indicated that effective teaching had a strong component of classroom management skills. That is, the teachers with the highest gains did not wait for student misbehaviors to occur and then take corrective actions; they avoided the need for such actions by letting the students know that they were aware of what was going on in the class. Their lessons had continuity and were characterized by a high percentage of the students displaying apparent engagement with the content.

The next stage in the process of using these findings for program improvement is for evaluators to work with Chapter I staff and administrators in the preparation of written teacher training packets that represent the bulk of the information presented in the full technical report. For presentation of the recommendations to teachers, non-technical statements of the findings, with many examples, and with specifications of "how much" or "how little" a particular behavior ought to be used will

all be crucial facets of the proposed teacher training packets. Several recent studies have shown that if teachers are convinced of the sound research basis of the recommendations, even a "correspondence course" training format in which packets are mailed out and teachers return self-administered checklists or tests can be effective. It is important that teachers be made aware that the recommendations are not based on opinion or untested theory about what methods work in Chapter I labs; they are directly tied to local findings from OCPS Chapter I learning labs.

After recommendations about effective strategies are presented to teachers, a new cycle of observations, followed by data analysis and interpretations, should follow. This procedure will allow a check (replication) of the original findings and will also indicate the degree to which teachers find it possible to implement the proposed recommendations. Ultimately, the Chapter I student population should be the beneficiaries of such a cooperative effort between evaluators, central office staff and administrators, and teachers.

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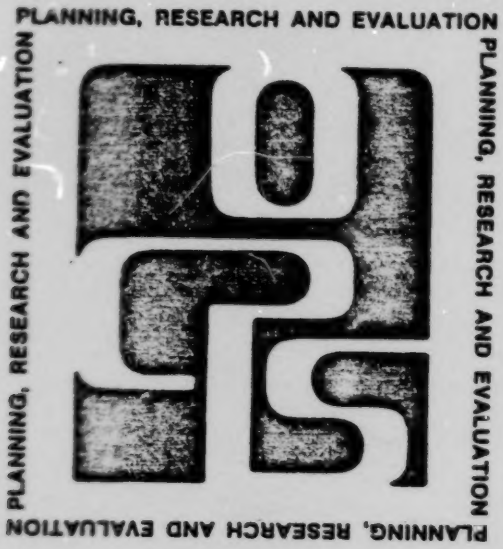
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A STUDY OF INSTRUCTIONAL PROCESSES IN TITLE I CLASSES: 1981-82

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A STUDY OF INSTRUCTIONAL PROCESSES IN TITLE I CLASSES

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A Study of Instructional Processes
in Title I Classes

Overview and Introduction

During the 1981-82 Academic year, a major component of the Title I (now Chapter I) program evaluation involved going into Title I classrooms and collecting objective observational data on teachers and their students. A total of 337 observations were made in 79 teachers' classrooms, spanning grades one through eight.

Given the extra trouble and expense of collecting and analyzing complex observational data, why should such a process be undertaken? Our position is that the collecting and analyzing of such data, followed by feeding the information back to teachers (in the form of recommendations about effective methods) is the most effective and well-established road to program improvement.

In effect, the collecting, analyzing, and feeding back (to teachers) of direct observational data constitutes the major portion of a model (or "paradigm" in some writers' terminology) that has been referred to as the "descriptive-correlation-experimental" loop. Lest we become stuck with this terminology as meaningless jargon, consider the nature of this model, stage by stage.

(1) Descriptive stage: As indicated by the label of this stage, the first priority is to describe, in detail, the phenomenon of interest (in this study, the actual instructional stra-

tegies were measured by: (1) frequency counts of teacher and student behaviors, (2) the number of minutes in the class period that were allocated to various activities, and (3) 5-point rating scales on more global estimates of classroom climate (such as the momentum of the lesson, the degree of use of higher-order questions, etc.). Such descriptive data (averages, variances, frequency distributions) provide at least two valuable sources of information: first, it gives a "baseline" measure of implementation against which change (or lack of change) can be assessed, and secondly, it gives program decision-makers some "hard" data on the degree to which policy is being translated into practice.

For example, even a simple variable like "number of students present for instruction" when measured and aggregated over a large portion of the year can prove interesting to Title I administrators; it may be that policy states 8 students per period will be served by the program, but in actuality, only an average of 5 students may be making it to the lab for instruction. The decision-makers would then have some results that could lead to new policies: either steps could be taken to decrease the incidence of pulling students out of Title I classes, or, the policy limit on number of allowable students per class could be increased.

(2) Correlational stage: After it is possible to describe the many activities that are taking place in the instructional setting, the next interesting question that occurs is; "What stu-

dent outcomes are related to the observed instructional activities?" As such, this is a correlational question, and the procedure requires computing relationships between measures of teacher and student behaviors with student "outcomes" that are valued. The valued outcomes can include measures of student engagement (time-on-task) and absence of behavior problems, as well as student achievement gains. Other compensatory or enrichment programs might be expected to influence affective outcomes such as self-concept. The legislated (and local) mandate for Title I is to strive for impact on the basic academic skills, therefore the relations of instructional processes to achievement gains will be one of the major concerns of this report. The kinds of conclusions and recommendations that result from the correlational analyses would be statements to the effect that a particular observed teaching strategy was associated with higher-than-average student gains in achievement. For example, our results showed that the Title I teachers who interacted the most with their students in a private (one-to-one) setting tended to have students who made higher achievement gains in reading. This kind of finding leads naturally to the next stage where "prescriptions" for effective teaching are developed and are presented to teachers as recommendations.

(3) "Experimental" (intervention) stage: By referring to the last stage of the model as the "experimental" stage, we really mean that an intervention (in the form of teacher inservice

training) will be carried out (and not necessarily that an "experiment" will be conducted, though an experiment could be carried out by simply intervening with a subset of the teachers). What would the intervention consist of? The content of the intervention with teachers would be based on the findings from the correlational and descriptive analyses described earlier. That is, recommendations about effective teaching methods would be derived from results generated by observing in classrooms, and would not be based on opinion ("expert" or otherwise) or on untested theory about what "ought" to increase student achievement. The recommendations would be as firmly grounded as is possible in data from Title I classes that show which teaching strategies do increase student achievement gains.

As an example, consider the finding that a high frequency of private teacher-student interaction relates to greater student gain in reading achievement. The recommendation would be that teachers who do not make use of this strategy (or, who do not use this method at least as much as the average amount) should attempt to increase their reliance on this method. Teachers who already use this method often (i.e., those whose descriptive data show them to be above the average on use of this method), would simply be advised to continue relying on private interactions. Without a doubt, no single teacher is initially performing all of the recommended strategies, though many (or most) of them will be initially in agreement with some of the recommendations

(because the data about effective strategies will have come from their own classrooms). The form of the prescriptions or recommended strategies should be written packets or booklets on effective methods and/or should consist of face-to-face meetings for the purpose of discussing the recommendations. After the intervention has occurred (i.e., after recommendations have been made to teachers), continued observation (on the same behaviors that were observed during the "descriptive" stage) will document the degree to which behaviors have been altered to attempt to implement the recommendations.

What kinds of behaviors and teaching methods should be selected for observation? These are what we refer to as our "process" measures (measures of instructional processes). In this study, we observed many different types of teacher-student interactions and different ways that teachers allocate their instructional time. All of the specific measures chosen had been shown in past research to relate to teaching effectiveness or were selected for their direct relevance to Title I instruction. We have also examined other, less-specific kinds of process measures, namely the measures of number of minutes of Title I instruction in reading and number of minutes in math. Although results of those analyses are not presented here in detail, we will briefly discuss them in order to indicate further the need for obtaining specific data on what is occurring <u>during</u> those

Title I instructional minutes.[1]

In general, the trend is for more minutes in the program to be associated with greater gains. When students are grouped according to the actual number of minutes in the program, we observe an incremental increase (that is statistically significant) in achievement gain with each increase in amount of time in the program.

Using spring-to-spring gains on the California Achievement Test total reading score, we find that students who received services for less than 2000 minutes gained, on the average, 1.4 NCE (Normal Curve Equivalent) points, those who received instruction for 2000-4000 minutes gained 1.9 NCE points, and those who were served for 4000-6000 minutes gained 3.3 NCE points. And, using spring-to-spring gains on total math, the data indicate that students who were served for less than 2000 minutes gained 3.2 NCE points, while those who received 2000-4000 minutes of Title I instruction gained 3.5 NCE points, and students served for 4000-6000 minutes gained 5.2 NCE points.

If we extrapolate the relationship between minutes in program and reading gains down to the point where the number of minutes equals zero, we find a predicted gain of only 0.9 NCE points.

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[1]For a more detailed description of the "minutes in program" analyses, see Crawford, J. "Relations between actual minutes in Title I and achievement gains," Oklahoma City Public Schools, Research Report, 1983 (manuscript in preparation).

Similarly, the predicted math gain for when number of minutes equals zero is only 2.4 NCE points. Therefore, it appears that the provision of the "optimal" amount of Title I instruction (4000-6000 minutes during the academic year) can increase a student's reading performance by 2.4 points (gain of 3.3 for minutes=4000-6000 minus gain of 0.9 for minutes=0) and can increase math performance by 2.8 points (gain of 5.2 for minutes= 4000-6000 minus gain of 2.4 for minutes=0).

Even though these gains due to the program are statistically significant, the question of their practical significance is a separate issue. We would argue that a gain of 2-3 NCE points per year can, indeed, constitute a meaningful and important improvement over what the gain would have been without the Title I program. For example, a 2-3 NCE point increase in gain could translate to a 4-6 point gain in percentile rank (relative to national norms). So, a student who received 4000-6000 minutes of Title I each year, for two years in a row, could advance his or her standing in relation to national norms by as much as 10-12 percentile points. It is surely non-trivial for a student to progress from the 20th to the 30th percentile (or from the 30th to the 42nd, etc.), nationally, in two academic years' time -- especially considering the fact that even remaining at the same percentile requires "growth" -- in fact, growth at the same rate as the national normative sample.

The reason for discussing the "minutes in program" relations

with gain is to give an example of one kind of influential "process" measure that is largely not under the control of the teacher. The bulk of this report will be focusing on classroom activities that the teacher does control (along with making recommendations about ways that teachers can increase their effectiveness). However, we do believe that the "burden" of program improvement is best shared by principals, program administrators, and district-level administrators (and evaluators). The factors that lead to a student receiving substantially less than the "optimal" amount of time in Title I can be classed into two broad categories: (1) Mobility and absenteeism, and (2) Pulling students from Title I during their scheduled time. If a child is ill or if his or her family moved into the district in mid-year, then there is nothing that the educational policy-makers can do to maximize time in Title I (to guarantee 4000-6000 minutes in the program). However, principals and district-level administrators can develop and implement policies that will minimize the time that Title I students are prevented from attending Title I because of conflict with other school-related activities. Discussions with Title I teachers have indicated that it is common for children to miss their scheduled Title I instruction because the regular classroom teacher needs the child to take a makeup exam or because of inconsistencies in schedules or because of within-school extracurricular activities or because of field trips, etc. A policy is needed that will state that, whenever

possible, Title I students are not to be pulled out of Title I instruction for these, or for similar, reasons. In order to convince administrators (at the school-level, particularly) of the need for such a policy, perhaps we should make an effort to disseminate the aforementioned findings on the relationship between minutes in the program and observed achievement gains.

The remainder of this report will present details of the results of the study of Title I instructional processes. The next section, on methodology, gives information on the procedures and instruments used in the study. To some degree, the report is organized in the same fashion as the "descriptive-correlational-experimental" model already described: first, mean differences on classroom behaviors between grade levels and between subject matter areas are described; next, correlations between instructional processes and outcomes that are valued are presented; and lastly, implications of the results for prescriptions and recommendations about effective teaching will be discussed. The purpose of this whole effort is to facilitate program improvement. The percentage of the total school day that can be allocated to Title I instruction is limited to 25%; once this maximum is attained or approximated, the primary option for enhancing student learning is to use the most effective curricula and instructional strategies.

The results that are reported in this paper come from a large-scale observational study carried out in Oklahoma City Public Schools (OCPS) Title I (now Chapter I) classes. There were several reasons for conducting this study:

(1) To gather objective, direct observational data on program implementation

(2) To be able to give Title I teachers and administrators specific feedback on activities occuring in Title I classes

(3) To develop prescriptive recommendations regarding methods that are most likely to foster academic growth in a Title I student population.

In addition, other important (though incidental) outcomes have arisen that we did not originally foresee. For example, this study is the only one of which we are aware that has ever applied the same observational procedures to samples of students that span eight grades. Because of our desire to be able to conduct process-product correlations using the Title I observational data, we have begun to grapple with the issue of separating the "Title I effect" from the "regular teacher effect" on student achievement. If and when that work comes to fruition, we will have a set of procedures that might serve in identifying effects attributable to any compensatory program operating in a larger context (i.e., in the district).

Most LEAs restrict their evaluations to the assessment of achievement gains. Typically, raw gains are calculated for Title I students and then are compared to the normative amount of gain reported by the test publisher. A few large-scale evaluations have relied on direct observational data: McDonald & Elias (1976), Stallings and Kaskowitz (1974), and Soar (1973). The McDonald & Elias study was a statewide assessment in California that formed the Beginning Teacher Evaluation Study; the studies by Stallings & Kaskowitz and by Soar were nationwide evaluations of project Follow Through. It is important to distinguish between these (and our current) studies and other "process" evaluations that rely only on interview and questionnaire responses as indices of program implementation and activities. While it surely serves some useful purposes to obtain participants' perceptions of program activities, this is no substitute for objective, behaviorally-defined observational measures.

There is also a recently accumulating body of evidence indicating that it is possible to impact (positively) on student behaviors by training teachers to interact with students in ways suggested as effective by observational data. This has been one of the goals of our current effort: After teachers have been given feedback on their own behaviors, recommendations (based on data from their own classes) are made about ways for increasing student engagement, decreasing discipline problems, and fostering greater achievement gains. Recent studies that are more in the

"research" than "evaluation" category have followed this paradigm (or variations thereof) with some success. Anderson et al. (1979), Crawford, et al. (1978), Good (1978), and Stallings, et al. (1979) all reported that teacher training that is directly tied to empirical findings on effective teaching can significantly enhance student engagement with content and subsequent achievement.

In this current effort, we have built upon established, state-of-the-art evaluation and research methodologies by employing low inference, high inference, and time use measures to describe the processes in OCPS Title I classrooms.[2] This report is both descriptive (i.e., presenting and discussing means) and relational (correlating process measures with other process variables and with achievement gains). The results tell us about differences between grade levels, context/subject matter differences (reading instruction vs. math instruction), correlations among process measures, and correlations between process variables and measures of student academic growth.

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[2] We also collected a large amount of questionnaire data that will be reported separately, so that all results reported here are based on direct observational measures.

The remainder of this report presents the methodology of the observational study, the results of the many analyses that were carried out on the observational measures, and discussion of those results.

Method

Subjects

The participants in this study were 79 OCPS Title I teachers and their students. Participation was voluntary; even so, 100% of those eligible did participate. The only OCPS Title I teachers not included in this study were those who were either working in non-public schools, or who spent part of their time in one school and part in another, or who were working in one of the special education centers. While we did record dyadic interactions between the teacher and individual students, individual student identity was not retained, so, the teacher was the unit of investigation. The N of teachers by grade-level was:

Elementary grades (1-4)	:	44
Fifth Year Centers (5)	:	12
Middle School grades (6-8):		23

The above grouping of grades arose directly from the administrative structure within the district -- that is, school-level "cohorts" were defined similarly in the OCPS district. Elementary schools serve grades 1-4, Fifth Year Centers serve grade 5 (and provide a "transition" period from elementary to middle school), and Middle Schools serve grades 6-8. All of the Title I classes that were observed had full-time aides assigned

to assist the teacher. While anecdotal records of aides' activities were made, the only systematic data collected on aides' behavior was a high inference rating on the degree to which the aide was involved in actually instructing the students. The focus of the investigation was the teacher and the students with whom the teacher was interacting.

Procedures

Before any actual data collection had begun, observers were trained to use the instruments reliably. Prior to training observers, the proposed observation procedures were piloted by the principal investigator (Crawford) in three classrooms. The measures were developed specifically with Title I classrooms in mind: expectations were that the emphasis would be on academics, that individual attention would be directed to students, and that a wide variety of activities would be observed.

The training of observers took one and one-half weeks, beginning with discussion of the different instruments, followed by practice and reliability sessions in which coding was done in classrooms and by observing videotapes. The six observers completed the training by demonstrating at least 80% inter-rater agreement (from coding done by pairs of observers in the same classroom) across categories in the low inference observational system and by agreeing within $\pm$ 1 point on the 5 point high inference rating scales. There were also checks to make sure that observers were all using the time use instrument consistently. While six observers did complete the training, 95.5%

of the data entering analyses was collected by four observers; the other two served primarily in a "back-up" capacity by helping collect data when schedule changes caused problems.

The plan was to get about 3 hours of observation data (1 hour per occasion on 3 separate days) collected in each classroom during the study. The time period for data collection was from the first week in March until the first week in May. In Elementary schools and Fifth Year Centers, periods were about 30 minutes each, so a 1 hour occasion was coded as 2 separate observations. An observation was completed (and a new one begun) when the current group of students left the Title I lab and a new group arrived. So, for grades 1-5, the 3 occasions (1 per day, 3 separate days) showed up as 6 observations. However, at the middle school level, periods were typically 50-55 minutes each. Therefore, an approximately equal amount of observation time would show up as fewer (separate) observations -- e.g., on 3 occasions (1 per day for 3 different days) we would get 3 observations at the middle school level. When considered at the teacher level, the amount of observation time was roughly equivalent across grades, even though the number of observations varied from 3 at the middle school level to 6 in the lower grade. Overall, usable data were obtained in 337 observations, across the 79 teachers. The majority of the results reported in this paper are based on the aggregated file, with $\underline{N}$ = 79 (the analysis of reading vs. math used the unaggregated data file with $\underline{N}$ = 337).

Instruments

The three major observational instruments used in this study will hereafter be referred to as the: low inference instrument, high inference instrument, and time use instrument.

(1) The Low Inference Instrument

In this study, low inference variables were measured with an adapted version of the Brophy-Evertson (1976) Dyadic Interaction Analysis System. In that system, codes are made for one-to-one interactions between the teacher and individual students in a variety of contexts. The major categories used in this study are described below.

Public Response Opportunities: Interactions coded in this category are public, academic interactions initiated by the teacher. Specific variables measure the quality (correctness) of the student's response and several different kinds of teacher feedback.

Student-Initiated Questions and Comments: Interactions coded in this category are public questions or comments from the students. The codes distinguish academic from non-academic questions and record the teacher's response to the question or comment.

Behavior-Related Interactions: Codes in this category reflect a student behavior problem and the teacher's subsequent corrective action. In addition, codes were defined for recording different types of disciplinary "errors" that the teacher could make.

Private Teacher - Afforded Contacts: These interactions are private (not intended for any students other than the one being contacted), and are initiated by the teacher. Specific variables measured the length of the interaction, the feedback (praise, criticism) given by the teacher, and whether the interaction was academic, social, or procedural.

Private Child - Created Contacts: The specific codes in this category are the same as for the Private Teacher - Afforded Contacts category; the difference is that the child-created contacts are initiated by the student.

Interested readers are referred to the coding maunal in Appendix E for more complete descriptions of all the variables.

(2) The High Inference Instrument

In order to measure aspects of the classroom environment not easily recorded with frequency counts from low inference variables, we also employed more global, 5-point "high inference" ratings. While these ratings surely require more observer judgment than the low inference variables, attempts were made to use behavioral definitions of points along the rating scales. The variables were chosen for their direct relevance to Title I, or because prior research on teaching (e.g. Kounin, 1970; Emmer & Peck, 1973; Brophy & Evertson, 1976) had indicated the relevance of the constructs. Variables measured student attentiveness, the use of aides, reliance on equipment, the degree of interruptions in the class period, and the approximate

length of transitions. In addition, the teacher's enthusiasm, amount of movement, degree of momentum and "withitness" (from Kounin -- "withitness" refers to the teacher's awareness of behavior problems and communication of that awareness), use of higher-order questions, distribution of time, and use of appropriate seatwork were assessed. These variables are described in detail in the coding manual in Appendix E.

(3) The Time Use Instrument

Many recent studies of effective teaching funded by the National Institute of Education, the California Commission on Teacher Preparation and Licensing, the Spencer Foundation and other groups have shown the amount of time that is allocated to academic basic skills instruction can influence student achievement gains. While allocated time can differ significantly from actual engaged time, there is a positive relationship between the two. The variables that were derived from our time use measure reflect the number of minutes of allocated academic and non-academic time in various grouping patterns. If the teacher is contacting students individually (usually during seatwork), the context was defined as individual; the variables then measured the number of minutes in this setting that were academic and that were non-academic. If the

teacher was working with more than one student at a time, but fewer than the number of students in the whole group, the context was defined as small group; the number of academic and non-academic minutes in this context were tallied. If the teacher was working with all students present, the context was whole group; number of academic and non-academic minutes in the whole group setting were recorded. "Academic" was defined as any content-related (subject matter) activity; "non-academic" time was time spent in procedural or social activities.

Results of Analyses of Between-Grade-Level Differences

Because of the large number of observational variables that did yield statistically significant ($p < .05$) differences across the three grade-levels, the tables in this section of the report only present the variables that showed differences. The first table presents the time use measures; Table 2. gives the high inference variables, and Table 3. presents the low inference variables that gave evidence of significant differences across grade-levels.

Table 1.
Time Variables With Significant Differences Across Grade Levels

Variable Name			
The amount of small group academic time (across all observations)	Elem	49.27	(N=44)
	5th Yr.	38.58	(N=12)
	Middle	15.22	(N=23)
The amount of small group non-academic time (across all observations)	Elem	4.48	(N=44)
	5th Yr.	2.92	(N=12)
	Middle	1.09	(N=23)
The amount of whole group non-academic time (across all observations)	Elem	6.05	(N=44)
	5th Yr.	2.42	(N=12)
	Middle	2.96	(N=23)
The total number of minutes (across observations) the teacher spent with small group	Elem	53.75	(N=44)
	5th Yr.	41.50	(N=12)
	Middle	16.30	(N=23)
The total number of minutes that were academic (across all observations)	Elem	133.27	(N=44)
	5th Yr.	135.92	(N=12)
	Middle	113.30	(N=23)
The total number of non-academic minutes (across observations)	Elem	16.68	(N=44)
	5th Yr.	15.25	(N=12)
	Middle	10.70	(N=23)
The proportion of elapsed time that was academic	Elem	0.89	(N=44)
	5th Yr.	0.90	(N=12)
	Middle	0.92	(N=23)
The proportion of whole group time that was academic	Elem	0.57	(N=44)
	5th Yr.	0.86	(N=12)
	Middle	0.74	(N=14)

The first two variables in Table 1. indicate that there were more minutes allocated to small group instruction, of both an academic and non-academic nature, in elementary-level classes. Fifth year center classes had the next highest mean, followed by Middle School Classes.

The third variable in Table 1. is the measure of the amount of time spent in whole group, non-academic activities. The mean for the Elementary grades is higher than for Fifth Year and Middle School grades. Generally, there was more whole group activity in the earlier grades (though the trend for the summary variable is not significant). There were a number of the elementary-level teachers who started their classes with whole-group "sharing" activities (these activities would have been coded as non-academic).

The total number of minutes the teacher allocated to small group instruction was greatest at the elementary level, then followed by the Fifth Year mean, and then the Middle School mean. On the measure of the total number of minutes coded as academic (regardless of grouping pattern), the Elementary and Fifth Year means are about the same (Fifth Year slightly higher), with the mean for Middle School classes more than 20 minutes lower.

The same pattern was found for the total number of non-academic minutes: the means for Elementary and Fifth Year classes were about the same, with the Middle Schol mean lower than the other two. Two proportion variables showed significant differences across grade-levels: the proportion of total elapsed time coded as academic and the proportion of whole group time coded as academic. The means for the first one showed that about 89% of total elapsed time at the elementary level was allocated to

academic content, with 90% of all time at the Fifth Year level being allocated as academic, and 92% of the time at the Middle School level being allocated to academics. While these means are statistically significantly different (because of restricted variances and relatively large Ns), the differences may not be large enough to be of practical significance. And, it should be remembered that we are dealing with allocated time which may not be the same as engaged time (e.g., seatwork activities usually count as academic allocated time, even though students may not have been actually engaged). The last variable in Table 1. represents the proportion of all whole group time coded as academic. The mean for Fifth Year Centers is highest, followed by the mean for Middle School classes, and then the mean for Elementary level classes.

Table 2. below presents the results for the high inference variables that showed significant differences across grade-levels.

Table 2.
High Inference Variables That Have
Significant Differences Across Grade Level

Variable Name		Means	
The rating on the classroom's seatwork difficulty	Elem	2.49	(N=44)
	5th Yr.	2.45	(N=12)
	Middle	1.92	(N=23)
The rating on the teacher's utilization of high (versus low) order questions	Elem	1.65	(N=44)
	5th Yr.	2.38	(N=12)
	Middle	1.85	(N=23)
The rating on degree of aide involvement	Elem	4.14	(N=44)
	5th Yr.	3.54	(N=12)
	Middle	2.98	(N=23)

There were three of the twelve high inference ratings that indicated significant differences across grade-levels. The rating on degree of seatwork difficulty showed means for Elementary and Fifth Year levels being about the same, with the Middle School mean lower than the other two. Since the observers judged this primarily by the number of times students called for help during seatwork, the finding suggests that students were asking for more help in the earlier grades.

The rating on use of higher-order (vs.lower-order) questions shows that questions requiring more synthesis, comprehension, analysis, etc. ("higher"-order cognitively) were more often observed in Fifth Year classes than in other grade-levels. The mean for Middle School classes was second highest, followed by the mean for elementary classes. The rating on degree of aide involvement in the lesson was found to decrease with an increase in grade-level -- the mean for elementary was highest, followed by the Fifth Year mean, with the Middle School mean being the lowest. This may simply reflect the fact that fewer students were present in upper - grade classes, thereby necessitating less aide involvement.

Table 3. below presents the results for the low inference variables.

Table 3.
Low Inference Variables That Are
Significantly Different Between Grade Levels

Variable Name		Means	
Number of students observed per class	Elem	7.80	(N=44)
	5th Yr.	7.01	(N=12)
	Middle	5.23	(N=23)
Total number of response opportunities	Elem	79.82	(N=44)
	5th Yr.	58.00	(N=12)
	Middle	24.26	(N=23)
Total number of public social or procedural contacts given by teacher	Elem	37.09	(N=44)
	5th Yr.	15.08	(N=12)
	Middle	10.48	(N=23)
Total number of student initiated questions or comments	Elem	49.80	(N=44)
	5th Yr.	23.83	(N=12)
	Middle	16.26	(N=23)
Total number of misbehaviors	Elem	16.43	(N=44)
	5th Yr.	5.50	(N=12)
	Middle	4.78	(N=23)
Total number of private teacher initiated contacts	Elem	68.27	(N=44)
	5th Yr.	53.83	(N=12)
	Middle	42.35	(N=23)
Total number of private child initiated contacts	Elem	45.73	(N=44)
	5th Yr.	43.42	(N=12)
	Middle	27.87	(N=23)
Total number of dyadic contacts	Elem	297.14	(N=44)
	5th Yr.	199.67	(N=12)
	Middle	126.00	(N=23)
Total number of public non-behavior related contacts	Elem	166.70	(N=44)
	5th Yr.	96.92	(N=12)
	Middle	51.00	(N=23)
Total number of private non-behavior related contacts	Elem	114.00	(N=44)
	5th Yr.	97.25	(N=12)
	Middle	70.22	(N=23)

Table 3., continued:

Variable Name		Mean	
Total number of non-behavior related contacts	Elem	280.70	(N=44)
	5th Yr.	194.17	(N=12)
	Middle	121.22	(N=23)
Total number of academic contacts	Elem	160.48	(N=44)
	5th Yr.	121.58	(N=12)
	Middle	66.00	(N=23)
Total number of verbal praises given by teacher	Elem	30.70	(N=44)
	5th Yr.	16.25	(N=12)
	Middle	6.78	(N=23)
The number of dyadic contacts per minute	Elem	2.00	(N=44)
	5th Yr.	1.34	(N=12)
	Middle	1.01	(N=23)
The number of academic contacts per minute	Elem	1.07	(N=44)
	5th Yr.	0.82	(N=12)
	Middle	0.52	(N=23)
The number of non-academic contacts per minute	Elem	0.93	(N=44)
	5th Yr.	0.51	(N=12)
	Middle	0.49	(N=23)
The proportion of all non-behavior related contacts that were public	Elem	0.55	(N=44)
	5th Yr.	0.51	(N=12)
	Middle	0.34	(N=23)
The proportion of all non-behavior related contacts that were private	Elem	0.45	(N=44)
	5th Yr.	0.49	(N=12)
	Middle	0.66	(N=23)
The proportion of all dyadic contacts that were response opportunities	Elem	0.25	(N=44)
	5th Yr.	0.30	(N=12)
	Middle	0.15	(N=23)
The proportion of all dyadic contacts that were public social or procedural, initiated by the teacher	Elem	0.12	(N=44)
	5th Yr.	0.07	(N=12)
	Middle	0.07	(N=23)
The proportion of all dyadic contacts that were private, teacher initiated	Elem	0.25	(N=44)
	5th Yr.	0.26	(N=12)
	Middle	0.37	(N=23)

Table 3., continued:

Variable Name		Means	
The proportion of all dyadic contacts that were private, child initiated	Elem	0.17	(N=44)
	5th Yr.	0.21	(N=12)
	Middle	0.26	(N=23)
The proportion of all dyadic contacts that were praises	Elem	0.10	(N=44)
	5th Yr.	0.08	(N=12)
	Middle	0.06	(N=23)
The proportion of all student questions or comments that were academic	Elem	0.33	(N=44)
	5th Yr.	0.50	(N=12)
	Middle	0.26	(N=23)
The proportion of all student questions or comments that were social or procedural	Elem	0.67	(N=44)
	5th Yr.	0.50	(N=12)
	Middle	0.74	(N=19)
The proportion of all misbehaviors that were mild	Elem	1.00	(N=43)
	5th Yr.	0.93	(N=9)
	Middle	0.99	(N=20)
The proportion of all misbehaviors that were severe	Elem	0.00	(N=43)
	5th Yr.	0.07	(N=9)
	Middle	0.01	(N=20)
The proportion of all misbehaviors that were acted upon directly by the teacher	Elem	0.02	(N=43)
	5th Yr.	0.18	(N=9)
	Middle	0.02	(N=20)
The proportion of all misbehaviors where the teacher made a timing error	Elem	0.01	(N=43)
	5th Yr.	0.08	(N=9)
	Middle	0.01	(N=20)
The proportion of all private teacher initiated contacts that were brief	Elem	0.52	(N=44)
	5th Yr.	0.36	(N=12)
	Middle	0.44	(N=23)
The proportion of all private teacher initiated contacts that were very long	Elem	0.18	(N=44)
	5th Yr.	0.29	(N=12)
	Middle	0.25	(N=23)
The proportion of all private teacher initiated contacts where the teacher gave verbal praise	Elem	0.12	(N=44)
	5th Yr.	0.10	(N=12)
	Middle	0.06	(N=23)

Table 3., continued:

Variable Name		Means	
The proportion of all private child initiated contacts that were brief	Elem	0.59	(N=44)
	5th Yr.	0.44	(N=12)
	Middle	0.55	(N=23)
The proportion of all private child initiated contacts that were long	Elem	0.29	(N=44)
	5th Yr.	0.40	(N=12)
	Middle	0.28	(N=23)
The proportion of all private child initiated contacts where the teacher gave verbal praise	Elem	0.13	(N=44)
	5th Yr.	0.08	(N=12)
	Middle	0.06	(N=23)

The first variable in Table 3. represents the average number of students present in the Title I classes during the observations. The mean at the elementary level is greatest, with the mean for Fifth Year classes next highest, and the mean for Middle School lowest. The measure of the total number of response opportunities showed substantial differences across grade-levels -- the mean for elementary classes was more than three times the mean for Middle School, with the Fifth Year mean roughly halfway between the two. The next five variables show the same pattern, though for some of them, the differences are less pronounced; the rank-order of means is: Elementary highest, then Fifth Year, then Middle School for the measures of total number of social or procedural contacts, total number of student initiated questions or comments, total number of misbehaviors, total number of private teacher-initiated contacts, and total number of pri-

vate child-created contacts. All of these variables are, in a sense, summarized by the next finding that the overall number of dyadic contacts varied statistically significantly from 297 to 200 to 126, respectively, for elementary, fifth year, and middle school Title I classes. In general, the elementary teachers interacted with their students more than twice as much as the middle school teachers and about 50% more than the fifth-year center teachers. Possible interpretations for these findings will be offered later, in the discussion section.

The trend is continued for the variable reflecting the number of public contacts that were not behavior-related, the total number of private non-behavior related contacts, and the sum of those two variables, the overall number of contacts that were not behavior-related. The measure of private contacts that were not behavior-related showed differences that were smaller than the other summary measures (a mean of 114 for elementary down to 70 for middle school grades), though the differences are still substantial and statistically significant. The total number of academic contacts also varied considerably between grade-levels: from 160 (elementary) to 122 (fifth year) to 66 (middle school). The total number of times the teacher was observed giving verbal praise varied from a mean of 30.7 to 16.2 to 6.8, respectively, for elementary, fifth year, and middle school grades.

The next three measures are rate variables. That is, they measure the frequency of behavior per unit of time. They were obtained by dividing the frequency count by the number of minutes of observation time. The first one is the measure of all dyadic contacts occuring per minute. On the average, there were 2 dyadic interactions per minute at the elementary level, 1.3 per minute in fifth-year classes and 1 per minute in middle school classes. We should note that the rate variables control for, or eliminate the effect of, any differences in amount of time of observation. The rate measure of the number of academic interactions per minute showed 1.07 for elementary, .82 for fifth-year classes, and and .52 for middle school. The rate of non-academic contacts per minute had means of .93 for elementary classes, .51 for 5th year classes and .49 at the middle school level. The rate of academic interactions is higher than the non-academic rate at all grade-levels; the difference is greatest at the fifth year level, where the academic interaction rate is 1.6 times the non-academic rate.

All of the remaining low inference variables are proportions. Proportions have the same sort of advantage over summary frequency counts that rate variables do. The difference is that the denominator in the proportion variables is a more "molar" (higher level) frequency variable instead of a measure of number of min-

ues. Therefore, proportion variables control for differences between teachers on overall number of interactions (whereas rate variables control for any differences on amount of time observed). For example, two teachers could have dramatically different frequency counts on the occurrence of verbal praise -- say, teacher A's value was 20 occurences of praise, while teacher B's value was 100 occurrences of praise. However, if we examine the variable "the proportion of all interactions in which the teacher used verbal praise" and we find that teacher A had a total of 100 interactions and teacher B had 500 interactions, their values on the proportion variable would be exactly the same (.20). That is, both teacher A and B used praise after 20% of their interactions.

The first proportion variable that was statistically significant across grade levels measured the proportion of all non-behavior related contacts that were public. The means decrease from .55 (elementary) to .51 (fifth year) to .34 (middle school), indicating more public activities in the earlier grades. As one might expect, the reverse is true for the next measure, the proportion of all non-behavior related interactions that were private -- the means increase from elementary to fifth to middle school grades. The proportion of all contacts that were response

opportunities was highest at fifth year centers, slightly lower at the elementary levels, and lowest at the middle school levels. The proportion of all interactions that were coded as public, social or procedural was higher at the elementary level and equally low at fifth year and middle school levels. The proportion of all dyadic contacts that were private and teacher-afforded was about the same in elementary and fifth year classes and substantially higher at the middle school level.

The variable measuring the proportion of all contacts that were private and child-created showei a monotonic increase with a corresponding increase in grade-level. The proportion of all dyadic contacts that included teacher verbal praise decreased from .10 at the elementary level to .08 in fifth year classes to .06 in middle school classes. The measure of the proportion of all (public) student-initiated questions or comments that were coded as academic was highest in fifth-year classes, next highest in elementary-level classes, and lowest in middle school grades. Conversely, the proportion of all public student-initated questions/comments that were <u>not</u> academic was highest at the middle school level, next highest at the elementary grades, and lowest at fifth year centers.

The next four variables are derived from the portion of the coding system dealing with student misbehaviors and teachers' disciplinary actions. Even though nearly all misbehaviors that

were observed were coded as "mild", there were some differences by grade-level on proportions of misbehaviors designated mild and severe -- .07 of the misbehaviors at the fifth year level were designated severe, with 0 at the elementary and .01 at the middle school level. It is difficult to know whether to take these results seriously, since one or two non-zero observations could have produced these "significant" results. The proportion of all student misbehaviors requiring teacher "direct" action (something more than a "mild desist") varied significantly across grade-levels: the fifth year mean was highest, followed by the two means for the other grade-levels. The higher proportion of teacher "direct" action disciplinary behaviors was, no doubt, in response to the more severe student misbehaviors mentioned above. The last behavior-related variable showing significant differences was the proportion of all student misbehavior occurences in which the teacher was coded as making a "timing" error (from the work of Kounin -- timing errors occur when the misbehavior is allowed to continue long enough to spread or increase in severity). The fifth year mean was higher than the means for the other grade-levels; this may be related to the higher number of "severe" misbehaviors and teacher direct actions in the fifth year data mentioned above. The distributions on these variables are highly skewed, and it may be that we are observing spurious effects due to one or two outliers.

The remaining six variables in Table 3. all come from the "private" context part of the low inference system. The proportion of all private teacher initiated contacts coded as brief was highest in the elementary grades, next highest in middle school, and lowest in fifth year classes. The opposite pattern was found for private teacher initiated contacts coded as very long (highest in fifth year classes, next highest in middle school, and lowest in elementary classes). The proportion of all private teacher-initiated contacts involving teacher verbal praise showed a decreasing trend with an increase in grade level. The measure of the proportion of all private child-created contacts coded as brief showed the mean for elementary grades being highest, followed by middle schools, then fifth year center classes. And, (as with the private teacher initiated context) the opposite pattern is shown for the proportion of all private child-initiated contacts coded as long -- i.e. the fifth year mean is the highest. Lastly, the proportion of all private child initiated contacts in which the teacher used verbal praise yielded a decreasing monotonic function of grade level -- from .13 at the elementary level to .08 for fifth year classes to .06 in middle school.

Discussion of Between-Grade Differences

In this discussion section we would like to propose and discuss two major sources or possible explanations of the observed between grade-level effects. One possible source is developmental maturation of the students; theories have been advanced by Piaget and Kohlberg in the areas of cognitive and moral development which could help account for some of the between grade-level differences. Another source which could help explain some of the many differences that have been identified is the relation of process measures to student achievement outcomes.

Development Trends

Theories by Piaget (1932) and by Kohlberg and Turiel (1971) predict certain changes in student behaviors, cognitions, and attitudes as they grow older. As a starting point, let us assume that a necessary, though not sufficient, condition of identifying developmental trends in our data is the presence of a behavior that is a monotonic increasing or decreasing function of the students' age. That is, a plot of the three grade-level means that is "V-shaped" or shaped like an inverted "V" would

not be presumed to have a developmental explanation. Applying this criterion to the results reported here yields several findings that appear consistently and statistically significantly. For example, as grade-level increases, the reliance on teacher-initiated and teacher-controlled interactions decreases. From the point of view of cognitive maturation, this makes sense. It seems as though the teachers are shifting some of the "load" or responsibility for the instruction to the students, as those students become more capable of bearing this load. In addition, the use of private interactions and reliance on student seatwork increases with an increase in the grade-level of the students. Again, this may be appropriate, given the students' increasing capability for self-motivation and self-monitoring.

We also find that the rate of teacher use of verbal praise decreases as the age of the students increases. This may reflect the moral/social development suggested by Kohlberg. As students mature, they tend to become less self-centered, and more aware of (and concerned about) how they are viewed by their peers. Teachers who recognized and acted upon this trend would tend to use less verbal praise with older students. As students begin to develop a sense of solidarity with their peers (as is probably happening in the upper grades in our study), singling them out of the group with overt verbal praise might be counterproductive. Brophy and others have speculated that this may

be one possible reason for some of the observed negative correlations between teacher praise and student achievement found in the literature.

Relations with Achievement Gains

Although we would not argue (in a fashion that seems backward, causally) that the observed differences in processes are due to achievement gain differences, it is possible to gain some insight into the nature of between grade-level effects by examining achievement differences alongside process differences. With the achievement data aggregated to the teacher level (as was the process data), consider the following results on total reading on the California Achievement Test.

Grade-Level	Raw Gains	Regression-Adjusted Gain
Elementary	2.377	10.562
Fifth Year	3.360	12.152
Middle	2.032	10.870

The mean for Fifth Year Center teachers is higher. What process variables may account for this? Table 3. presented means on the rate of academic interactions and rate of non-academic interactions per minute. If we compute the ratio of the rate of academic interactions to the rate of non-academic interactions, we find that ratio is highest for fifth year center teachers (the ratio is 1.6 for fifth year classes, 1.15 for elementary level and 1.06 for middle school level). It may be that when reading gains are the outcomes, it is important to have a relatively high

proportion of the verbal interaction rate being content-related (more important than simply having a high overall rate of interactions). These results are also interesting in pointing out the difference between allocated academic time and actual student engagement. Readers may recall that the means for allocated academic time were around 90% of the total time (results from the time use instrument). And yet, when we look at the nature of the interactions within that allocated "academic" time, only at the fifth year level do we find the rate of academic interactions (per minute) being very much higher than the non-academic rate.

The results below summarize the teacher-level data on total math gains.

Grade-Level	Raw Gain	Regression-Adjusted Gains
Elementary	4.849	18.656
Fifth Year	1.352	15.942
Middle	3.339	17.168

Now, a pattern different from the reading results emerges. The math gains are highest at the elementary and middle school levels and lowest at the fifth year level. Again we ask the question, "What process variables show this same "V-shaped" pattern?" The most salient group of measures showing this kind of pattern are the private contact variables (both teacher-afforded and student-initiated) involving brief teacher-student

interactions. Apparently, the more effective teachers in math relied on fast-paced private interactions (not necessarily verbal and not all content-related). These contacts were brief enough to allow them to circulate to all students in the class. This could be easily argued as a productive and efficient monitoring method (especially given the small class sizes in Title I).

In summary, our currently available results suggest that many of the observed between-grade level differences are "appropriate" when viewed from a perspective based on developmental theories and other empirical work. And, there seems to be some evidence that the relatively high ratio of academic to non-academic rates of interaction (at the fifth year level) may contribute to higher reading gains. In math, the teachers and grade-levels showing the highest gains tend to make use of efficient monitoring strategies -- they work with students individually on a fairly fast-paced schedule that permits a high rate of brief one-to-one contacts.

Results of Anaylses of Differences Between Reading and Math Processes

The results to be presented and discussed in this section of the report come from the data file that has not been aggregated -- that is, the observation (and not the teacher) is the unit of analysis. The original N of 337 observations was reduced to 324 because we excluded the observations (N = 13) where both reading and math activities were observed.

The design analyzed was a 2 x 3 analysis of variance, with the subject matter context defined as reading vs. math, and the grade-level factor defined as elementary (grades 1-4) vs. fifth year centers vs. middle school (grades 6-8). This design allows us to detect subject matter main effects as well as interactions between subject matter and grade level. The grade-level main effects were not attended to (or presented) in this report since those results were discussed in the previous section. We further reduced the amount of results presented by including only the variables that showed statistically significant ($p < .05$) effects for the subject matter main effects or for the interaction between subject matter and grade-level.

Results are presented first for the time use variables, then for the high inference measures, and then for the low inferences measures.

Table 4. below gives the means and Ns for the time use variables that showed significant main effect differences

between reading and math contexts. None of the time use variables had significant interactions between subject matter and grade-level.

TABLE 4. Time Use Variables that Showed Differences Between Reading and Math Contexts

Variable Names	Subject Means
1. The number of minutes of individualized academic time per observation	Reading $\bar{x}$ = 15.31 (N=178) Math $\bar{x}$ = 18.62 (N=146)
2. The number of minutes of small group academic time per observation	Reading $\bar{x}$ = 10.66 (N=178) Math $\bar{x}$ = 6.18 (N=146)
3. The number of minutes of whole group non-academic time per observation	Reading $\bar{x}$ = 1.29 (N=178) Math $\bar{x}$ = 0.86 (N=146)
4. The number of minutes of elapsed time per observation	Reading $\bar{x}$ = 34.76 (N=178) Math $\bar{x}$ = 31.55 (N=146)
5. The number of minutes of total individualized time per observation	Reading $\bar{x}$ = 16.98 (N=178) Math $\bar{x}$ = 20.12 (N=146)
6. The number of minutes of total small group time per observation	Reading $\bar{x}$ = 11.47 (N=178) Math $\bar{x}$ = 6.79 (N=146)
7. The number of minutes of total academic time per observation	Reading $\bar{x}$ = 30.99 (N=178) Math $\bar{x}$ = 28.59 (N=146)
8. The number of minutes of total non-academic time per observation	Reading $\bar{x}$ = 3.77 (N=178) Math $\bar{x}$ = 2.97 (N=146)
9. The proportion of time spent in small groups that was academically related	Reading $\bar{x}$ = 0.93 (N=92) Math $\bar{x}$ = 0.84 (N=57)

The first variable in Table 4. represents the number of minutes of individualized, academic time in reading and math. The means favor the math context by about 3.3 minutes, indicating that the math classes were observed to have spent significantly more time in individualized, academic activities (typically seatwork) than did the reading classes. The next variable represents the number of minutes of small group, academic time. The mean for the reading context is more than 4 minutes greater than for the math context, indicating greater use of small group instruction. The third variable in Table 4. showing significant differences is the measure of the number of non-academic minutes in a whole-group setting. For that measure, the statistically significant differences may not have any practical significance: the magnitude of the mean difference is less than ½ of one minute in favor of the reading classes. This difference could be an artifact of simply more (total) time being allocated to whole group instruction in reading, since the mean for reading was also higher (though non-significantly) for the number of minutes allocated to whole group, academic activities.

The next variable in Table 4. represents the total length of the Title I classes in reading and math. Overall, the reading

classes were about 3.2 minutes longer than math classes. The following variable is a measure of the total amount of time coded as individualized instruction time (aggregating academic and non-academic time together). The mean for math is greater than the mean for reading. And, we find that the mean for total time allocated to small group instruction is greater in reading than in math.

The variables in Table 4. measuring the total number of academic minutes and the total number of non-academic minutes both favor the reading context. This appears to be a result of the earlier-mentioned finding that the total elapsed time was greater in reading. In fact, one of the variables analyzed that showed no significant difference was the proportion of all time coded as academic (the mean for reading was .89, and the math mean was .91). The last variable in Table 4. measured the proportion of all small group time that was coded as academic. The means favor reading (a proportion of .93 vs. .84 for math), suggesting that when small group activities do occur, there is a greater likelihood of academic interactions in reading than in math.

The results in Table 5. below present means for the high-inference variables that showed significant effects.

TABLE 5. High Inference Variables: Main Effects for Subject Matter and Interactions with Grade Level

	Type of Variable		Subject Mean	
1.	The frequency of higher order questions asked of the class		Reading $\bar{x}$ = 2.12 (N=165) Math $\bar{x}$ = 1.56 (N=140)	
			Reading	Math
2.	The enthusiasm rating of the observed Title I teachers	Elem.	3.09 (N=100)	3.02 (N=95)
		5th Yr.	3.08 (N=39)	3.26 (N=23)
		Middle	3.00 (N=39)	2.04 (N=28)

The measure of teacher use of "higher-order" questions (vs. lower order) showed significant reading vs. math differences. Higher-order questions were defined as questions that require students to analyze, evaluate, and comprehend information more than could be done by relying on rote memory and/or definitions. Since the mean in reading was higher, we conclude that the Title I reading classes were significantly more often characterized by this type of activity than were the math classes. Apparently, the math observations were more likely characterized by drill or rote-learning activities than by math reasoning activities.

The one other variable presented in Table 5. showed a significant interaction between subject matter and grade-level. The

high inference rating on enthusiasm was defined by teacher behaviors such as movement, voice inflection, facial expressions, etc. The mean ratings on enthusiasm for reading declined slightly (from 3.09 to 3.08 to 3.00) with an increase in grade-level (grade-level was a 3 level factor: elementary, fifth year centers, and middle schools). However, for math, the enthusiasm rating was highest for fifth year center teachers (3.26), next highest for elementary level teachers (3.02), and considerably lower for middle school teachers (2.04). Although the between-subject main effect was not quite statistically significant (p = .09), the mean for reading was higher than the mean for math. These results suggest that the relatively low enthusiasm rating in math at the middle school level is primarily responsible for the significant interaction and the near-significant main effect.

The remaining data to be presented come from the low inference observation system. Those results are separated into two tables: Table 6. presents means for variables that showed significant main effect differences, and Table 7. gives results for the measures that had statistically significant interactions between subject matter and grade-level.

TABLE 6. Low Inference Variables: Main Effect Differences Between Reading and Math

	Variable Names	Subject Means
1.	The number of students in attendance per observation	Reading $\bar{x}$ = 7.29 (N=178) Math $\bar{x}$ = 6.67 (N=146)
2.	The total number of response opportunities given students per observation	Reading $\bar{x}$ = 17.07 (N=178) Math $\bar{x}$ = 10.43 (N=146)
3.	The total number of dyadic interactions per observation	Reading $\bar{x}$ = 56.50 (N=166) Math $\bar{x}$ = 50.84 (N=141)
4.	The total number of public non-misbehavior related interactions per observation	Reading $\bar{x}$ = 32.29 (N=166) Math $\bar{x}$ = 23.39 (N=141)
5.	The total number of non-misbehavior related interactions per observation	Reading $\bar{x}$ = 53.79 (N=166) Math $\bar{x}$ = 48.18 (N=141)
6.	The total number of academic interactions per observation	Reading $\bar{x}$ = 31.69 (N=178) Math $\bar{x}$ = 27.18 (N=146)
7.	The proportion of non-misbehavior related interactions that were public	Reading $\bar{x}$ = 0.52 (N=166) Math $\bar{x}$ = 0.42 (N=141)
8.	The proportion of non-misbehavior related interactions that were private	Reading $\bar{x}$ = 0.48 (N=166) Math $\bar{x}$ = 0.58 (N=141)
9.	The proportion of all interactions that were response opportunities	Reading $\bar{x}$ = 0.25 (N=166) Math $\bar{x}$ = 0.17 (N=141)
10.	The proportion of all interactions that were private teacher initiated	Reading $\bar{x}$ = 0.27 (N=166) Math $\bar{x}$ = 0.33 (N=141)
11.	The number of opinion questions per observation	Reading $\bar{x}$ = 0.85 (N=178) Math $\bar{x}$ = 0.25 (N=146)

Table 6., continued:

	Variable Names	Subject Means
12.	The proportion of total response opportunities that asked for opinion	Reading $\bar{x}$ = 0.06 (N=134) Math $\bar{x}$ = 0.02 (N=84)
13.	The proportion of total response opportunities where the teacher gave the answer	Reading $\bar{x}$ = 0.08 (N=124) Math $\bar{x}$ = 0.04 (N=80)
14.	The proportion of (public) student questions or comments that were accepted by the teacher	Reading $\bar{x}$ = 0.90 (N=141) Math $\bar{x}$ = 0.84 (N=111)
15.	The proportion of (public) student questions or comments that were not accepted by the teacher	Reading $\bar{x}$ = 0.10 (N=141) Math $\bar{x}$ = 0.16 (N=111)
16.	The proportion of all (public) student questions or comments that were academic	Reading $\bar{x}$ = 0.39 (N=141) Math $\bar{x}$ = 0.31 (N=111)
17.	The proportion of all (public) student questions or comments that were social or procedural	Reading $\bar{x}$ = 0.61 (N=141) Math $\bar{x}$ = 0.69 (N=111)
18.	The proportion of private teacher initiated contacts that were very long	Reading $\bar{x}$ = 0.21 (N=167) Math $\bar{x}$ = 0.24 (N=130)
19.	The proportion of private student initiated contacts that were academic	Reading $\bar{x}$ = 0.45 (N=157) Math $\bar{x}$ = 0.56 (N=129)
20.	The proportion of private student initated contacts that were procedural	Reading $\bar{x}$ = 0.46 (N=157) Math $\bar{x}$ = 0.37 (N=129)
21.	The proportion of private student initiated contacts that were very long	Reading $\bar{x}$ = 0.12 (N=157) Math $\bar{x}$ = 0.17 (N=129)

The first variable in Table 6. that showed a significant difference between reading and math was the number of students present during the observations. The mean N for reading was 7.29, and the mean for math was 6.67. While the magnitude of the difference is not large, this finding does indicate that, generally speaking, more students were being instructed in reading classes than in math.

The next five variables are summary-type measures that refer to the total number of interactions in several different contexts. While these measures do represent somewhat different contexts, they are highly related -- that is, a high value on one of the variables is likely to be associated with high values on the others. The total number of response opportunities, total number of dyadic interactions, total number of non-behavior related public interactions, total number of non-behavior related interactions, and the total number of academic interactions all show mean differences in favor of reading classes. This finding of more interactions in reading could be due to the differences in the nature of reading and math instruction, and, to some degree, could be an artifact of having more students present in reading classes (the greater the N of students, the greater the opportunity for interactions).

We also find there are significant differences between reading and math on the proportion of interactions coded as "public" (where more than one student could potentially benefit from the interaction) and private. Fifth-two percent of the interactions in reading were public, while 42% of the math interactions were public. And, 48% of the interactions in reading were private, with 58% of the math interactions being coded as private. That is, in reading, most of the interactions were public, while in math, most of the interactions were private.

The proportion of all interactions coded as academic response opportunities (which are public) was higher in reading, while the proportion of all interactions that were teacher afforded (private) contacts was higher in math. Teachers were more likely to initiate public academic interactions in reading and private contacts in math. As one might expect, the total number of opinion questions and the proportion of all questions coded as opinion were higher in reading than in math. The mean on the feedback variable representing the proportion of questions after which the teacher gave the answer (following the student's incorrect response) was higher in reading.

The next group of four variables is derived from the portion of the coding system that measures student-initiated questions and comments in a public setting. Overall, the proportion of student-initiated questions and comments that were accepted was higher in reading than in math; correspondingly, the proportion of student-initiated questions and comments that were not accepted was higher in math. The proportion of student-initiated questions and comments coded as academic was higher in reading, and the proportion of student-initiated social/procedural interactions was higher in math.

The last group of variables in Table 6. represents measures of private teacher-student contacts. The proportion of teacher initiated private contacts coded as "very long" (defined as more than 30 seconds continuously) was higher in math than in reading. The proportion of child created private contacts that was academic was significantly higher in math classes. The proportion of child created private contacts that was procedural showed a higher mean in reading, and the proportion of all (private) child-created contacts coded as very long was higher in math.

Table 7. below presents results for the low inference measures that showed statistically significant interactions between subject-matter and grade-level.

TABLE 7. Low Inference Variables' Interactions Between Subject Matter and Grade Level

Variable Names	Interaction Means		
	Grade Level	Reading	Math
1. The proportion of total response opportunities where the teacher asked another child to respond	Elem.	.02 (N=81)	.02 (N=61)
	5th Yr.	.02 (N=31)	.05 (N=15)
	Middle	.03 (N=22)	(N=8)
2. The proportion of student initiated questions or comments that were accepted	Elem	.87 (N=85)	.86 (N=80)
	5th Yr.	.96 (N=31)	.74 (N=15)
	Middle	.92 (N=25)	.80 (N=16)
3. The proportion of student initiated questions or comments that were not accepted	Elem	.13 (N=85)	.14 (N=80)
	5th Yr.	.04 (N=31)	.26 (N=15)
	Middle	.08 (N=25)	.16 (N=16)
4. The proportion of all misbehaviors that were mild misbehaviors	Elem	1.00 (N=70)	1.00 (N=67)
	5th Yr.	.99 (N=18)	.92 (N=8)
	Middle	1.00 (N=16)	.96 (N=12)
5. The proportion of all misbehaviors that were severe misbehaviors	Elem	(N=70)	(N=67)
	5th Yr.	.01 (N=18)	.08 (N=8)
	Middle	(N=16)	.04 (N=12)
6. The proportion of all misbehaviors in which an overreaction occurred	Elem	(N=70)	(N=67)
	5th Yr.	(N=18)	(N=8)
	Middle	(N=16)	.02 (N=12)

(continued next page)

Table 7; continued:

7. The proportion of private child initiated contacts that were procedural	Elem	.44 (N=85)	.33 (N=84)
	5th Yr.	.41 (N=37)	.50 (N=20)
	Middle	.55 (N=35)	.39 (N=25)

The first variable in Table 7. represents the proportion of feedback in which the teacher asks another student a question that was answered incorrectly by the first student. In reading, the means are about the same across grade-levels, while in math the means range from .02 at the elementary level to .05 in 5th year center classes to 0 at the middle school level. Although statistically significant, these differences may not be large enough to be practically significant. The measure of the proportion of student-initiated questions and comments that were accepted showed a significant interaction: in reading, the mean for 5th year center was highest, followed by middle school and then elementary; in math, the mean for elementary was highest, followed by middle school and then 5th year centers. As expected, the proportion of student-initiated questions and comments <u>not</u> accepted showed the opposite pattern (also significant) as the previous variable measuring proportion accepted.

The next three variables are derived from the behavior-related section of the observational instrument. While the interactions between grade-level and subject were statistically significant, results are difficult to interpret because of the limited amount

of variance and the highly skewed distributions for these variables. For example, nearly 100% of the misbehaviors coded were classified as "mild" (in math, the means for 5th year center and middle schools were .92 and .96, respectively), as opposed to "seve.e". And, there were almost no teacher "overreactions" observed -- the significant interaction is due to the one cell with a non-zero mean (math, middle school, with mean = .02).

The last variable in Table 7. is the measure of the proportion of all private child created contacts that were procedural. The means for reading were highest at the middle school level, next highest at the elementary level, followed by the 5th year mean. In math, the 5th year mean was the highest, with the middle school mean next highest, and the elementary-level with the lowest mean.

Discussion of Results of Reading vs. Math Analyses

If we exercise appropriate caution in interpretations, we might be able to derive some clues about effective strategies in reading and math from these data. Historically, the OCPS gains in math are higher and more consistent than in reading (see Crawford, 1982). The fact that this same trend has been found in nationwide evaluations of compensatory education (Carter, 1980) may indicate that some inherent difficulty exists in overcoming deficits in reading -- to a greater extent than in math. Carter

(1980), in the Sustaining Effects Study report, speculated that the percentage of the total amount of instruction and learning time in math that occurs in school is greater than the percentage for reading; therefore, math scores are more easily influenced than reading. Alternatively, it may be that the practices in use (in OCPS and elsewhere) in Title I math instruction are, to some degree, generally more effective or "appropriate" than the methods used in reading. We would not lay the "blame" for this state of affairs on the teachers (indeed, at the elementary level, most teachers teach both math and reading, so a between-teacher effect seems improbable), but rather on the Colleges of Teacher Education responsible for training the teachers. As an example of the problem, consider the fact that the Educational Testing Service recently commissioned two reviews of the literature in the area of classroom management. The one by Crawford and Robinson (1982) focused on empirically - determined effective strategies, while the Weber and Roff (1982) report relied on books and resources actually in the teacher education market. With only a couple of exceptions, there was no overlap in the references and content of the two reports. Most Colleges of Teacher Education are not known for their reliance on teaching effectiveness research.

All of the above discussion is meant to indicate that we may find some hints about how to make reading instruction more effective in the results in this report on differences between reading

and math contexts. To begin with, there was a (statistically non-significant) trend for a greater proportion of time to be allocated to academic content in math than in reading. And, there was more individualized instruction in math than in reading. Although some of the other teaching effectiveness studies (e.g. Brophy and Evertson, 1976; Stallings, et al., 1974) have found whole class or group instruction more effective than individualized instruction, those studies were conducted in regular classrooms with one teacher working with 20-30 students. It makes sense that in Title I Learning Center labs that have one teacher and one aide working with only 6-10 students, the individualized attention method of instruction could be more appropriate and effective. (In earlier studies, the primary reason given for the apparent "ineffectiveness" of individualized instruction was that the other 25-30 students were difficult to monitor and keep on task while the teacher was working with one student at a time.)

Our data also showed that in child-created private contacts in math, the proportion of interactions coded as academic was greater than in reading. The proportion of child-created private contacts coded as procedural was greater in reading than in math. The research literature has consistently indicated that procedural interactions are often negatively correlated with achievement

gains while academic interactions are positively related to gains.

Other results indicated that in reading, teachers were more accepting and encouraging of student's comments and questions (in a public setting) than in math. While we would not recommend that teachers never accept student initiated comments and questions, the prior research studies have found some negative correlations between rates of student-initiated questions and comments and achievement gains -- presumably because such activities interrupt the flow of discussion, remove control of content from the teacher, and thereby lead to less momentum, continuity, and engagement with content.

We would not claim that all of the reading vs. math differences identified in this report should be used as a basis for changing reading practices. For example, the high inference variable that showed more higher-order questions in reading than in math probably reflects "natural" or "appropriate" differences in the two subject matter areas. It seems sensible that the reading observations would be more typically characterized by more questions that require students to comprehend, analyze, and synthesize information. Math activities, particularly in Title I labs where the primary emphasis is on basic skills, are quite naturally oriented more toward drill and practice instead of higher-order reasoning functions.

The prescriptions about methods that ought to increase student achievement should be based on empirical results of the OCPS observational study and other studies of teaching effectiveness and should be theoretically consistent and interpretable.

Results from Correlations of "Criterion" Process Variables with All other Process Measures

In this section of the results we present correlations among process variables. Eleven of the measures were selected as "criterion" process variables.

Of the full list of 101 analysis variables (See the lexicon in Appendix A for definitions), the eleven below were identified as being considered desirable teaching practices. These eleven have been shown to be related to achievement gains in prior studies. The eleven variables are:

High Inference Measures of:

1. Momentum - a rating of the degree a lesson is non-fragmented, has a cohesive orientation and a lack of slowdowns.

2. Withitness - a rating of the degree a teacher monitors the class frequently and lets the students know that he or she is aware of what's going on.

3. Student Attentiveness - a rating of the proportion of students in the class who appear to be attentive most of the time.

Time Allocation Measures of:

4. Overall Proportion of Time that was Academic - the proportion of elapsed time observed that was academic.

5. The Proportion of Individualized Time that was Academic - the proportion of time allocated to individualized work that was academic.

6. The Proportion of Small Group Time that was Academic - the proportion of time allocated to small group work that was academic.

7. The Proportion of Whole Group Time that was Academic - the proportion of time allocated to whole group work that was academic.

Low Inference Measures of:

8. The Rate of Dyadic Interactions - the number of dyadic interactions per minute.

9. The Rate of Academic Dyadic Interactions - the number of academic dyadic interactions per minute.

10. The Proportion of Dyadic Interactions that were Academic.

11. The Proportion of Student Responses followed by Teacher Feedback - the proportion of times a child's incorrect, "don't know", or no response was given feedback by the teacher.

These eleven measures were correlated with all of the remaining process measures in an effort to determine what other classroom practices are associated with these 11 "known" effective practices. The results section discusses these relationships, and the discussion section for these results summarizes the findings. The actual correlation coefficients are in Appendix B.

Discussion of Correlational Analyses of Process Variables

The following section discusses the results of relating the 11 criterion process measures with the remaining process variables. The tables presented in Appendix B are the correlation coefficients computed for these analyses. Correlations marked with double asterisks are significant at the .01 level, while those marked with a single asterisk are significant at the .05 level. Three correlations are presented for each combination of criterion-process and process variable. The top one is the overall correlation for all teachers (N = 79). The lower left is for elementary teachers (N = 44) and the lower right is for upper (5-8) grade teachers (N = 35). Fifth year center classes and middle school classes were combined in this analysis since they fall under the same administrative structure and since there were not enough Fifth Year Center teachers to analyze separately. A lexicon of the definitions of the variables is included in Appendix A to facilitate interpretation.

The remainder of this results section will be devoted to explaining the results contained in the correlation tables in the appendix. The results are presented in three parts. The first part gives the results for the high inference process-criterion measures. The three measures in that section (momentum, withitness and student attentiveness) are considered desirable aspects of the classroom environment. The results will indicate which of the other classroom processes are associated with each of the

three aspects of global climate. A similiar set of analyses will be presented for the four measures of time allocation that were considered desirable (total proportion of time coded as academic, and the proportion of whole group, small group or indivdualized time that was academic). The four measures of dyadic contacts deemed desirable (the rate of dyadic contacts, the rate of academic dyadic contacts, the proportion of academic contacts and the proportion of feedback given by teachers) were also presented in the same way.

In creating these statements of results, we tried to avoid the use of words that would imply causation. These results tell only what measures are statistically related to each other. The results can, however, be used profitably as indicators of what seems to relate to effective teaching practices within the Title I classes in the Oklahoma City Public Schools. The next section of the report will discuss the relation of these classroom processes to gains in student achievement.

These results are the only ones we are reporting that did <u>not</u> use data separated out by reading and math contexts. Since we are looking for relationships <u>among</u> process measures, it is reasonable to ask the question "What classroom behavior and activities relate to the "criterion" process variables <u>without</u> <u>regard</u> to subject matter?" In one sense, these analyses are geared to address the "internal consistency" of our observational measures -- i.e., the degree to which the many different measures agree with

each other. Provided that the correlations in this section are sensible, we can be fairly confident in the reliability of the observation variables, and we will gain knowledge about what classroom activities related to more time-on-task and more student engagement.

Results Pertaining to High Inference Measures

The high inference observation instrument was designed to collect information on the more global aspects of the Title I classroom environment. Three variables derived from this instrument were considered measures of desirable aspects of the classroom climate and were used as "outcome" or criterion process variables. These three aspects that were rated by the observers were lesson momentum, teacher withitness, and student attentiveness. These ratings have been shown in past research to be related to student achievement gains. This section presents the relationships between these three variables and all the other observed classroom behaviors.

Lesson Momentum

Lesson momentum is a rating of the degree to which the lesson is non-fragmented, has a cohesive orientation, and a lack of slowdowns. It may be thought of as the degree of continuity in the lesson. The overall pattern of results indicates that for both elementary and middle grades, lesson momentum was associated with higher amounts of whole group work, with more teacher

enthusiasm and withitness, and with higher student attentiveness. In elementary grades, in addition to the above, a lesson with high momentum also was found to have few interactions concerning misbehavior, less criticism during private talks with the teacher, and a teacher who distributed his/her time more equally among the children. In grades 5 through 8, higher momentum was associated with less individualized work, more public and less private contacts (that were non-behavioral), more private child-initiated contacts that were long, and relatively more private teacher-initiated contacts that were social.

Teacher Withitness

Teacher withitness is a rating of the degree to which the teacher monitors the class frequently and lets the students know that he or she knows what is going on. The overall pattern of results suggests that withitness is a variable that may both affect and be affected by other classroom processes. For both grade levels, higher teacher withitness is associated with higher student attentiveness, and more allocated academic time. Higher withitness is also related to higher teacher enthusiasm. At the elementary level, higher withitness is associated with higher amounts of interactions between teacher and students, especially about academic matters. Also, the interactions seem to involve small group work, more praise and less criticism. At the middle grades, higher withitness is related to more individualized

academic work (with the teacher as monitor), fewer misbehaviors and teacher timing errors, more higher-order questions, and fewer interruptions.

Student Attentiveness

Student attentiveness is a rating made by the observer concerning the proportion of students in the class who are attentive most of the time. More "attentive" classrooms have been shown to have higher achievement gains in past research. In general, the results showed that student attentiveness is related to classroom processes that tend to maximize the amount of academic time, and lessen the amount of interruptions, lengthy transitions, and student misbehaviors. For elementary grades, more attentiveness is related to more whole group work, less criticism and less teacher use of clues or rephrasing. For middle grades, higher attentiveness is related to more individualized academic time, more use of equipment and materials, fewer incorrect answers, less criticism and fewer misbehaviors that involve teacher timing or target errors.

Results Pertaining to Time Allocation Variables

Data on time allocated to various kinds of student grouping patterns was collected as part of the observation procedure. Of particular interest were four variables that measure the proportion of time that was allocated to academics. The total proportion of time allocated to academic activity is discussed first,

followed by discussion of three variables concerning academic time allocated during individualized, small group, or whole group work.

Overall Proportion of Time Allocated for Academic

The results for the overall proportion of academic time allocated to academic activity are presented first. The results for the proportion of time that was academic showed that for both elementary and middle grades, this was related to more individualized academic work, higher withitness, and shorter transitions. Other variables tend to confirm the validity of the proportion measure. At elementary grades, higher overall proportion of academic time seems to be associated with whole group academic work, and, generally, less praise. For middle grades, a higher proportion of academic time was associated with more small group work that was academic, more "very long" private child-initiated contacts, and fewer public student-initiated contacts.

Proportion of Individualized Time Allocated for Academic

The next time use measure represents the proportion of time allocated to individualized work that was academic. The results for time allocated to individualized academic work showed that for both grade levels, this measure is related to less non-academic activity in general. At elementary grades, this variable is related to more dyadic interactions, and more whole group activities, including non-academic work. At the middle

grades, this measure of individualized academic time was related to more private teacher-initiated academic contacts, higher withitness, distribution of time equally among students, and shorter transitions.

Proportion of Small Group Time Allocated to Academic

This variable is defined similiarly to the previous one, except here we are referring to small group work. There were not many significant relationships, in general, and none that were consistent for both elementary and upper grades. At the elementary grades, more small group academic time is related to higher teacher withitness. For middle grades, it is related to less criticism during private child-created contacts.

Proportion of Whole Group Time Allocated to Academic

The last time use variable to be discussed is the proportion of time allocated to whole group work that was academic. The results for whole group academic time showed that it was related to less small group work and fewer private teacher-initiated academic contacts. For elementary grades, more whole group academic time is related to less small group time, a lower rating on teacher movement and use of aides, and fewer private contacts. For fifth through eighth grades, the only relation is with the number of higher-order questions asked by the teacher.

Results Pertaining to Dyadic Interactions

In addition to the three measures of global climate, and the three measures of time allocation, four measures of dyadic interactions were expected to relate to the qualify of instruction. These four are: the overall rate of dyadic interactions (frequency per minute), the rate of academic interactions, the proportion of contacts that are academic (content-related), and the proportion of student incorrect responses where the teacher gives feedback to the student. These four measures describe, in large part, a classroom where there is a lot of teacher-student interactions, primarily academic interactions, and where the teacher provides verbal assistance when students are having problems. Results for these four measures are presented next.

The Rate of Dyadic Interactions

The rate of dyadic interactions was computed by dividing the total number of dyadic interactions observed by the total elapsed time. The rate is in units of interactions per minute. The results for the rate of dyadic interactions showed that a higher rate of dyadic contacts per minute was associated with more whole group work that involved praise and was public, as opposed to private. For elementary grades, a higher rate was associated with more contacts that were social or procedural, involved criticism, or where brief, and with fewer contacts that were private. For the upper grades, the rate was highest for teachers who were high

on enthusiasm, and who used more difficult seatwork.

The Rate of Academic Dyadic Interactions

This variable is similiar to the last one except that we now refer to the rate of academic contacts per minute. A large number of significant relationships were found for the rate of academic contacts. Many of these relationships are considered part-whole relationships because the rate variable was composed of a number of more specific measures. In general, a higher rate of academic contacts seems to be associated with more public rather than private contacts, more whole group or small group work, as opposed to individualized work, and with teacher ratings of high momentum, enthusiasm and distribution of time among more students. For elementary grades, a higher rate of academic interactions was associated with higher withitness and shorter transitions. Also, a higher rate of academic contacts is related to a lower proportion of private teacher-initiated contacts that were social or very long, and fewer public teacher-initiated contacts that resulted in student response of "I don't know" or no response. For the upper grades, a higher rate of academic contacts was related to more difficult seatwork, a higher proportion of private teacher-initiated contacts that included praise, a lower proportion of private teacher-initiated contacts that were procedural, and fewer interruptions.

The Proportion of Dyadic Contacts That Were Academic

This variable is similiar to the rate of academic contacts, except here we are referring to the proportion of all dyadic contacts that were academic rather than the absolute rate of academic contacts per minute. This measure controls for the overall number of dyadic contacts by computing a proportion of all contacts coded as academic. The results for the proportion of dyadic contacts that were academic are very similiar to the results for the rate of academic dyadic contacts. One should note that here too, many of the relationships are "part-whole" associations (where one variable constitutes part of the other) probably represent somewhat inflated relationships.

Proportion of Teacher Feedback

The final measure to be presented involves the proportion of times a student's incorrect answer, "don't know" response, or no response was followed by teacher feedback. It was expected that teachers who give feedback to children when they are having problems responding are more effective with their students. The overall pattern of results seems to indicate that the measure of the proportion of responses given feedback is not related to the academic variables, and seems mostly to relate to variables involving interactions that were more public and social or procedural. It may be that there is a third variable intervening in these relationships and that third variable is causing both of

these sets of variables to be high. The fact that the preponderence of the relationships were for the upper grades suggests that it may be due to developmental level. The feedback variable reported here was computed as a sum of several different types of teacher feedback. This may have caused problems with interpretation since other results (particularly the correlations with achievement reported in the next section) have shown different patterns of relations, according to which types of teacher feedback we examined.

With a few exceptions, the results generally confirmed our expectations. With the great majority of the relations being in agreement with other literature or with theory, we can be fairly confident that the observational instruments are measuring what was intended. If no relationships had been identified, or, if those identified had not been sensible or interpretable, then the reliability and validity of the study would be in question.

The next two subsections will briefly summarize the results on relations among process measures. Then, the last results, on relationships between teaching strategies and student gains, will be presented.

Summary of Overall Results

A substantial number of significant relationships was found between effective teaching practices and other measures of climate (from high inference variables), time use, and dyadic interactions. The relationships are complex with some of the variables being related to effective practices differently, depending on the grade level taught by the teacher. In some instances especially with the dyadic interaction variables, the relationships are the result of "part-whole" relationships where one variable enters into the computation of the other. It is expected that the parts of a variable will relate to the whole. These part-whole relationships were typically not discussed in the results and will be ignored in this summary.

A teacher with high ratings or observed levels of the eleven criterion process measures would have a class characterized as highly task-oriented and smoothly run. The class would have high proportions of time coded as academic, relatively high proportions of dyadic interactions that were academically-related, and would have teachers who are good at monitoring their class and have smooth running lessons. Although no single teacher in the sample may have exhibited all of these characteristics, many displayed some of these behaviors.

For both elementary and middle school grades, the "ideal" teacher (based on these process criteria) had classes with higher attentiveness, more interactions, fewer interruptions and shorter

transitions, more withitness, fewer behavior problems and a more equal distribution of his or her time among students.

Summary of Results by Grade Level

In addition to the classroom processes listed above, the results for elementary teachers also showed other classroom processes to be related to effective processes. At the elementary level, the teachers who were high on the "effective" process measures also had higher momentum ratings and shorter transitions between lesson parts.

For middle school and fifth year center teachers, the results indicated that, in addition to the processes that were significant for the whole sample, they also had fewer interruptions, fewer misbehaviors, more individualized academic time, and shorter transitions. Also, the upper grade teachers made more use of higher-order questions, more use of equipment and materials, and had more difficult seatwork. The data also suggest that teachers displaying the effective behaviors were more enthusiastic and moved around the classroom more.

These results indicate the complexity of this research. Effective behaviors for one grade level or subject matter do not necessarily make them effective for another. Teaching is a complex business, and attempting to discover, through research, what differentiates effective from ineffective practices is also a complex process. The results here should be considered

tentative, until they have been confirmed in subsequent studies. The findings do, however, lend some credence to the notions that the observational instruments yield fairly consistent data and that the variables measure what they are supposed to measure.

CORRELATIONS OF INSTRUCTIONAL PROCESSES WITH STUDENT ACHIEVEMENT GAINS

The method of analysis used for relating instructional processes and achievement gains first required that we aggregate the observational data separately for reading and math. This was done to allow correlating reading processes with gains in reading and math processes with gains in math. If the aggregation had not been done separately for reading and math, we would be trying to correlate a mix of reading and math activities with reading scores and a mix of reading and math activities with math scores. We proceed with the assumption that the teaching methods that are effective in reading may be different from the methods that are effective in math.

The grade-level of the classrooms was handled in two ways: first, we looked for relations between instructional processes and student achievement that were statistically significant ($p < .10$) across all grade-levels; then, we examined correlations separately within two groupings of grades -- elementary grades (1-4) vs. fifth year and middle school grades (5-8). Fifth year classes were not considered separately because the N would be too small to allow the reliable detection of relationships. This method of analyzing the data permits the identification of strategies that are effective across grades as well as indicating

which methods are effective in the early grades (1-4) only and those which are effective in the upper grades (5-8) only.

Each of the measures from the low inference, time use, and high inference instruments were correlated with two kinds of gain scores: A raw gain score and a "regression-adjusted" gain score. Conceptually, these two kinds of outcome measures are quite similar in that they both represent the amount or degree of academic growth. The raw gain is obtained by simply subtracting the pre-achievement NCE score from the post NCE score. The problem with the raw gain is that it still correlates with pre-score (negatively, such that low prescore level is related to high gains). This problem is solved by using the regression-adjusted gain which guarantees that the gain measure will be zero correlated with pre-score. Even though the adjusted gain offers this statistical "advantage" over raw gain scores, the two kinds of gain are not independent of each other. There is a moderately strong tendency for teachers who have students with high raw gains to have high adjusted gains also. The criteria for considering a teaching behavior as a candidate as an effective strategy was that the correlation between the process (classroom behavior) measure and <u>one or both</u> of the gain measures had to be statistically significant ($p < .10$). This section of the report involves compiling these identified behaviors into a set of "profiles" of effective teaching strategies.

It should be noted that any time a large matrix of correlations is examined and "culled" down to only the significant relationships, there is a chance for spurious, non-sensical relationships to be identified as being "significant". For example, out of 100 correlations, one could expect 10 to be statistically significant (with $p < .10$) by chance alone. Because of this potential problem, we also examined each of the identified relations for agreement with theoretical interpretations and/or with other empirical results. A few of the correlations were not included in the production of the profile of effective behaviors because they did not meet this final criteria -- that is, the direction of the correlation made no sense. In every case, when we attempted to track down the reason for such non-sensical relations, we found that the correlations were being influenced by a small number of "outliers" or that the process measure was a very infrequently occurring variable that probably had little or no reliability, given the number of observations that we were able to make. For example, in some contexts we found <u>negative</u> correlations between the high inference ratings of the teacher's enthusiasm and gains and between "withitness" and gains. Scatterplots of these relationships indicated that the relations that would have (otherwise) been zero were changed to negative slopes by a small number of extreme scores. Since there is no apparently tenable psychological or educational explanation for these relationships, we dismiss the correlations as being spurious and

will not include them in the narrative discussion of effective and ineffective teaching strategies. All of the significant relationships, spurious or not, are presented in the tables in Appendix C.

Results for Reading

The first results pertain to relationships between instructional processes during the teaching of reading and achievement gains in total reading on the California Achievement Test. The first results presented come from analyses of all grade-levels (1 through 8); subsequent results are presented for elementary grades only (1-4) and, for upper grades only (5-8).

The process measures derived from the time use instrument describe the actual number of minutes allocated to academic and non-academic activities in contexts defined by different grouping patterns. In reading, the most effective grouping pattern (across all of grades) appears to be individual, one-to-one interactions. The teachers who were observed allocating more time for academic interactions in an individualized (private contact) setting were the ones whose students tended to have the highest gains. We also found that teachers who allocated more of the available time for academic activity, regardless of grouping pattern, had students with higher reading gains. This latter finding agrees with much of the recent "time-on-task" literature which indicates that more allocated academic time leads to more

student engagement with content and, consequently, more student learning.

High inference variables showing significant relations with achievement included ratings of seatwork difficulty and the use of higher order questions. The high inference rating of seatwork difficulty depended primarily on the frequency with which students raised their hands or otherwise asked for help during individualized seatwork activity. This rating showed positive correlations with achievement gains, suggesting, perhaps, that the teachers who made themselves most available for answering student questions during seatwork tended to have the highest gains. Those teachers displayed a high degree of monitoring of their students' progress and probably encouraged students to ask for help if they needed it.

The other high inference rating that showed positive relations with gains represents the teacher's use of "higher-order" questions. Higher-order questions were those requiring the students to comprehend, analyze, and synthesize information, rather than simply respond from "rote" memory. This finding makes sense if one considers the fact that the outcome (achievement) measure with which we are correlating the process measures represents components that measure some "higher-order" cognitive skills. That is, the total reading scores are derived from items requiring comprehension and analysis, in addition to items testing for lower-order skills (such as vocabulary). The implication of this

finding is that teachers should ask questions that require students to engage the same types of mental processes that will be required to perform well on standardized achievement tests. If the outcome measure represented only lower-order cognitive skills, such as vocabulary, then the use of higher-order instructional questions would not be expected to correlate positively with outcomes.

There was a fairly large number of low inference variables that correlated significantly with reading gains. The summary or aggregated variables that are formed by combining lower-level (more discrete) measures showed a quite consistent pattern. In general, the more interactions between teachers and students, the greater the observed gains. This finding is reflected in the positive correlation between the total number of non-behavior-related interactions and reading gains. Also, the total number of academic interactions, the total number of private interactions (that were not behavior-related), and the total number of private child initiated interactions were positively related to achievement gains in reading. We also found that the total amount of time correlated positively with gains, indicating that classes with longer periods tend to be the ones with greater gains. The rate of non-academic interactions correlated significantly negatively with gains, indicating that teachers with more procedural, social, or behavioral interactions per minute tended to have students with lower gains. And, perhaps best repre-

senting these findings for the summary process variables, a significant positive relationship was found between the measure of the ratio of the academic rate of interactions (per minute) divided by the non-academic rate and achievement gains. That is, the teachers whose rate of academic interactions was high in comparison to their non-academic rate tended to have students with higher gains. This finding demonstrates that use of time and quantity and quality of interactions all have an impact on student learning. The results also showed that the total number of opinion questions asked by the teacher related positively to gains. Although opinion questions are not necessarily content-related, they do require the student to assess "why" or "how" explanations, and therefore this result may be in agreement with the earlier-mentioned finding on use of higher-order questions.

The remaining variables correlating with reading gains across all grade-levels are proportion measures. In a public context in which the teacher is asking academic questions, the proportion of questions which the teacher followed with verbal praise showed negative correlations with gain, supporting other studies which have shown the use of too much praise (particularly in a public setting) to be counter-productive. By "too much" praise we mean praise that is more frequent than about 15% of the time. That is, based on the mean of the process variable, the data indicate that the more effective teachers were the ones who praised fewer than 15% of their students' correct answers in a public setting.

We also found that the proportion of times that the teacher asked another child a question that was answered incorrectly by the first child (all in a public setting) correlated negatively with gains -- i.e., teachers wh used this feedback procedure a high percentage of the time tended to have relatively low gaining students. This agrees with the Brophy and Evertson (1976) finding that lower SES students' gains are not facilitated by moving from student to student following incorrect responses; in their work, measures of sustaining feedback or of the teacher giving the answer correlated positively with gains.

Analysis of behavior-related variables showed that the proportion of all misbehaviors that were dealt with by a mild desist was related positively to gains while the proportion of all misbehaviors given a "warning" correlated negatively with reading gains. These findings could lead to the recommendation that if a misbehavior occurs, a mild desist (such as calmly telling the student to stop the inappropriate activity) is a better teacher reaction than a warning.

Some of the "private contact" variables correlated with gains -- for example, the proportion of teacher afforded contacts that were social showed a positive relation with gains. The means for this measure were low, however, and the recommendation would be that at least a small amount of social interactions is better than none (<u>not</u> to "maximize" social interactions). The other two variables showing relations with gains refer to

teacher "criticism". Criticism was defined as including communication of higher expectations to the students ("you can do better than that"). Those higher expectations may serve a mediating influence between some use of "criticism" and the observed higher gains. When the student initiates a private, one-to-one interaction, the results showed a positive relation between the proportion of interactions with some criticism and gains. However, when the teacher initiates the interaction, the proportion of contacts with criticism showed negative relations with gains. The means on all of the criticism measures are very low -- only in a small percentage of all observations was there any "criticism" coded. The very few non-zero observations may have produced unreliable variance, with the resulting correlations being spurious. Or, perhaps the teachers who were coded as giving some criticism when the student initiated the interaction communicated higher expectations which led to increased gains.

The results discussed so far came from analyses including all eight grades -- they may be thougnt of as "generic" findings (for reading) in the sense that we had not separated the early grades from the upper grades. In the following results, correlations are analyzed separately for elementary grades (first-fourth) and then for fifth year and middle school grades combined.

The maximum N in the analyses of reading process-outcome relations was 63. The correlations for elementary grades (first-fourth) are based on a sample size of 38, while the grade

5 through 8 data come from 25 classrooms.

Elementary Grades

In the time allocation data, the number of minutes in individual and small group instructional modes was found to correlate positively with student gains. Total time and total number of academic minutes also correlated positively with achievement gains. These results tend to support other "time-on-task" results -- even though students will not be "engaged" with the content 100% of the time, the teachers who allocate more minutes to the pursuit of the academic content tend to have students with higher gains. Whole group instruction appears to be less effective in these grades, in reading, than individual and small group instruction.

High inference variables showed that the seatwork rating and the rating of the distribution of the teacher's time both correlated with gains. The seatwork rating reflected the degree to which students raised their hands for help. Classes in which these behaviors are observed frequently will probably tend to be taught by teachers who are effective and busy monitors. Positive correlations could result because of these teachers contacting students frequently and encouraging them to ask for help when it's needed. The negative correlations for the rating on distribution of teacher time indicate that elementary teachers who were frequently observed working with 1 or 2 students for extended periods tended to have higher gaining classes.

The low inference variables that showed relations with reading achievement gains in the elementary grades also reflected the apparent effectiveness of individual (one-to-one) private contacts. Both teacher-afforded and child-created private contacts (total frequencies) correlated positively with reading gains. We also found that the total number of dyadic interactions (public and private, academic and non-academic) correlated positively with gain. As expected, the summary "time-on-task" measures like total number of academic interactions correlated positively with gains. As in the analyses across all grades, the total number of opinion questions correlated positively with gain in the elementary grades (the correlation was not significant in the upper grades, suggesting that the earlier-discussed finding on opinion questions was really being caused by the elementary grade classes).

In the early grades, the proportion of public questions followed by praise was negatively correlated with gain. The proportion of student incorrect answers (or no response) followed by the teacher rephrasing or cluing the child (i.e., providing feedback that sustains the interaction) correlated positively with reading gains. The proportion of questions followed by the teacher asking another child (i.e., terminating the interaction) correlated negatively with gains. These results support the advisability of "sticking with" a student to assist him or her in improving his or her response, rather than moving on to another

student when the first one responds incorrectly.

We also found that the proportion of public, student-initiated interactions that were questions correlated positively with gains at this grade-level, while the proportion of public, student-initiated interactions that were comments correlated negatively with reading gains. Apparently, the teachers who encouraged questions from students were getting questions that were either content-related or were being asked in order to solve some procedural problem that was preventing or impeding learning. On the other hand, student "comments" will probably not facilitate learning if they disrupt the flow of the lesson and decrease attention to the content to be learned.

As was indicated by the analyses across all grades, the use of mild desists was more effective than warnings in the elementary grades when a misbehavior occurred. These data also showed that some (small) use of work-related criticism was related to higher gains, in the private context when students were initiating the interaction.

Fifth Through Eighth Grades

The remaining results for reading come from analyses with maximum N of 25 -- grouping together Fifth Year and Middle School classes. One of the variables from the time use instrument, the number of minutes of individualized instruction that was coded as non-academic, correlated significantly negatively with student gain. This result reflects a tendency for teachers who create a

"seatwork" or individual mode of instruction without focus on content to have students with relatively lower gains. We also found that the number of whole group minutes, even if non-academic, related positively to reading gains. This may be a spurious finding or may reflect a trend at this grade-level, whereby the more effective teachers spend at least a small amount of time with the whole group of students, either as "procedural, set-up" time, or for social interactions (which could aid in building of rapport).

Several of the high inference variables that relate to successful classroom management were found to be significant predictors of student reading gains in the upper grades. For example, the variables from the Kounin work measuring momentum and withitness were both positively correlated with gains in the upper grades. The teachers rated high on momentum were those who had few lesson fragmentations and few, if any, "slowdowns" in presentation of lesson content. And those with high withitness ratings behave as if they have "eyes in the back of their heads" -- they know what's going on in their classroom and they let the students know that they know what's going on. Another indication of the effective upper grade teacher as a smooth manager of the classroom environment is the negative correlation between the rating of frequency of interruptions and gains. The interruptions (whether from sources in or outside of the classroom) were minimal in the teachers' classes that were among the higher gainers in our sample.

We also found, consistent with results from the early grades, that the rating of seatwork difficulty correlated positively with gains. The judgment of seatwork difficulty was primarily based on how often the students raised their hands or otherwise called for the teacher's help during seatwork activity. These teachers may have been displaying effective monitoring behavior by encouraging students to call for help rather than becoming frustrated at their lack of progress. Another possibility is that some degree of difficulty is required for seatwork to be effective. Some students respond best under conditions of some challenge.

The variable representing the overall classroom "attentiveness" level showed significant positive relations with reading gains in the upper grades -- the classes with more students engaged for a higher percentage of the time had higher achievement gains. This variable was not a significant predictor of gains in the total sample analysis (other work has indicated there is some difficulty in assessing actual student engagement through ratings of apparent attentiveness).

The measure of distribution of teacher time across students showed opposite-direction relations with gain in comparison to the elementary data. Whereas in grades one to four the higher gaining classes were the ones where the teacher spent a lot of time with 1 or 2 students at a time, in the upper grades, the teachers who distributed their time across as many students

as equally as possible tended to have classes with the highest gains. This may reflect a developmental need for a greater degree of individualization in the early grades.

The low inference variables with significant relations with achievement in the upper grades showed some agreement with elementary-level results, and some disagreement. The ratio variable computed by dividing the academic rate of interactions (per minute) by the non-academic rate showed significant positive correlations with gain. The teachers who had a higher proportion of interactions coded as academic, public questions also tended to have higher gaining students.

The pattern of results for public student-initiated questions and comments was reversed from the pattern in the elementary grades: the proportion of all student-initiated interactions that were <u>questions</u> showed negative relations with achievement while <u>comments</u> were positively correlated with gain. Perhaps in the later grades, it is more important to encourage some student comment -- the effects of increased motivation and interest might override any possible negative effects due to disrupting the flow of the lesson.

An indication of the need for some non-academic interactions in the upper grades is the positive relation between the proportion of private teacher - afforded contacts coded as "social" and gains. The means on this variable were generally low, so one would not recommend "maximizing" this kind of interaction, but

rather, to use this strategy for at least a small portion of the class period. And, as in some of the other data, there were positive relations between proportion of questions with criticism and gains; we speculated before that criticism can convey higher expectations. Lastly, we observed a negative correlation between the proportion of child-created contacts that were brief and reading gains. This finding suggests that the upper grade teachers with the higher reading gains did not tend to rely on brief contacts, to a large degree, when the student initiated the private interaction; instead, they used a higher proportion of "long" or "very long" contacts.

Results for Math

As indicated earlier, the observational data for math were aggregated separately from reading to allow separate computation of process-product relations. The content and goals of reading and math instruction are so different that it makes sense to allow for the identification of different groups of effective strategies in the two different content areas. For math, the results are organized in the same way as for reading: first the findings from the analysis of the whole sample are presented, then the results are presented separately for elementary grades (first through fourth) and the upper grades (fifth through eighth). The maximum N of classes across all grades in math is 56, with N of 37 in the elementary grades analyses and 19 in the upper grades.

Across all eight grades, there were two variables from the time use instrument that correlated significantly with gains in math: the number of minutes of academic activity in the small group setting and the total number of minutes in small group activity. The correlations between these time variables and math gains were positive, indicating that teachers who relied on small group instruction in math relatively more than others also tended to have high gaining students.

Among the high inference variables showing relationships with gains were the rate of interruptions, the rating of the lengths of the transitions, and the rating on distribution of teacher-time across students. Results showed that classes with more interruptions tended to have lower achieving student. Length of transitions also correlated negatively with gains, indicating that classes characterized by more time in transitions also tended to have lower gains. The rating on how the teacher distributes his or her time across students correlated negatively with math gains, suggesting that some teachers whose students were high gainers were observed working with 1 or 2 students at a time in extended contacts.

A number of low inference variables correlated with gains in math for the whole sample. A consistent pattern showed many of the summary variables representing the degree of teacher-student interaction being positively correlated with gain. And, particularly the variables representing <u>public</u> interactions showed

up as strong positive predictors of gains in math. In reading, the results indicated private interactions were positively associated with gains, while in math, the findings suggest that use of public question-and-feedback sessions is most strongly associated with gain. In math, we found that the total number of opinion questions correlated positively with gains (in this case, agreeing with the reading results).

The proportion of all interactions that were public student-initiated questions or comments was significantly positively associated with math gains. The proportion of all interactions that were private, child-created contacts was negatively correlated with gains. The math data showed (in agreement with the reading results) that the proportion of public questions followed by overt verbal praise was related negatively to gains. The proportion of the time that the teacher repeated the question (a "sustaining" type of feedback) after a student answered incorrectly was positively associated with gains. Negative correlations were found for the measure of the proportion of times the teacher asked another child the question when the first student responds incorrectly. The best strategy seems to be to sustain the interaction to help the student improve his or her response.

The correlations for the private interaction proportion measures show that when teaching math, the use of brief private contacts is associated with higher gains, while teachers with

high proportions of their private contacts being long (or "very long") tend to have students with lower gains in math. Therefore, in math, the teachers who use private contacts for brief, fast-paced interactions tend to have the higher gains. We also found negative relations between the proportion of child-created private contacts coded as social and math gains, and lastly, the results showed the proportion of (private) child-created contacts that were procedural being positively associated with math gains.

Elementary Grades

In grades one to four, the maximum N in the math analyses is 37. Three of the variables from the time allocation instrument showed significant correlations with gains. The total amount of elapsed time correlated positively with math gains, suggesting that the classes with longer periods also tended to have greater gains. We also found that the proportion of the total time that was allocated for academic activity correlated significantly positively with math gains. And, the proportion of all whole group time allocated for academics was found to relate positively to gains in math.

Among the high inference measures showing significant relations with gains were the same variables already discussed for the total math sample (all grades): ratings of interruptions, ratings of the lengths of transitions, and ratings on how the teacher distributes his or her time across students. The directions of the correlations in the elementary sample were the same

as in the total sample. The more interruptions the lower the gain; and, the shorter the transitions, the higher the gain in math. Results also suggested that teachers who distributed their time such that a portion of each period was spent in extended contacts with 1 or 2 students tended to have higher gaining students. Since these relations were the same as in the total sample, and since these findings were not reflected in the upper-grades sample, we conclude that the "total sample" findings (all grades) were really being caused by the elementary grades results.

The low inference variables that correlated with math gains in the elementary sample support and extend the findings already discussed. Summary variables representing engagement with content showed some of the expected relationships: the ratio variable created by dividing academic rate of interaction by non-academic rate correlated positively with gains. The proportion of all teacher-initiated public interactions that were coded as "social or procedural" correlated significantly negatively with gains, indicating (at least for this grade-level) that higher math gains were not associated with high numbers of public, social and procedural interactions. The proportion of all interactions that were public, student-initiated questions or comments correlated positively with gains, suggesting that teachers who encourage student initative and involvement in the lesson tend to have high gaining classes.

Two of the low inference measures of the quality of the

student's response showed significant correlations with gain. The proportion of all student reponses coded as incorrect was positively related to gain, indicating that the teachers with a relatively high rate of student incorrect responses (e.g., above about 20% wrong) tended to have higher achieving classes. Those teachers apparently handled the students' mistakes in a supportive, non-threatening fashion. The variable measuring the proportion of all student responses coded as "don't know" or no response was negatively related to gains. This supports other work that has shown the least effective questioning strategy with lower achieving students to be to allow the students to mumble "I don't know" or make no response at all. Even a wrong answer is better than no response.

Analysis of feedback variables suggested negative correlations for public, verbal praise and positive correlations for the measure of the proportion of wrong answers followed by the teacher repeating the question. This latter finding is one more indication that "sustaining" feedback from the teacher (i.e., feedback that continues the interaction) is more effective than feedback that terminates the interaction by re-directing the question to another student.

Private child-created contacts coded as social or as "very long" (defined as more than 30 seconds continuously with the same student) were negatively correlated with gains, while the proportion of private child-created contacts coded as procedural was

positively correlated with gain. This positive correlation for procedural interactions was somewhat surprising, though it may be explained by the fact that many of the Title I students may have required some (procedure-related) help prior to beginning a lesson. With machines, audio-visual aides, and materials like "Versa-Tiles", some procedural assistance preparatory to the learning experience might facilitate student achievement.

Fifth Through Eighth Grades

The following variables were significantly correlated with math gains in the upper grades sub-sample. The maximum N in these analyses was 19.

For the first time in any of these process-product correlations, we found that the number of students present was a significant predictor of gain. The direction of the correlation was negative, indicating that the teachers whose gains were the highest tended to have smaller sized classes.

The time variables showed that the total amount of time, the total amount of academically allocated time, and the proportion of all time allocated to academics were all positively related to gains. The teachers who allocate more time to the pursuit of academic content tend to have higher gaining students. The time use data did not suggest one particular grouping pattern (individual vs. small group vs. whole group) as being more effective than any other.

Results from the low inference measures indicated that the total number of private, teacher-afforded contacts was positively associated with gains, as was the measure of the total amount of time. The total frequency of praise and the proportion of all interactions that involved teacher praise correlated negatively with gains. In addition, two of the private contact measures involving praise showed negative correlations with gain -- the proportion of all private teacher-afforded contacts with praise and the proportion of all private child-created contacts with praise. The only praise measure with a positive relationship with math gains in the upper grades was the measure of the proportion of all public student-initiated questions and comments receiving praise. Except for using praise to encourage student initiative and involvement in the lesson, it does not appear that reliance on verbal praise is associated with greater gains.

The findings for this grade-level in math show some evidence of positive relations between measures of criticism and gains, particularly in a private-contacts setting. We have speculated that communicating higher expectations through non-threating criticism could facilitate the students' learning. We have also noted that the means on the criticism variables are quite low, therefore the recommendations that is based on the positive correlation between criticism and gains would <u>not</u> be to use criticism "a lot" or to use it a high percentage of the time. <u>Occasional</u> mild, critical remarks (directed at the work, and not

at the person) can motivate the students and enhance learning.

As we have found in other contexts, the proportion of all student responses that were correct showed negative relations with gain -- indicating that the teachers with the higher gaining classes were the ones with relatively more incorrect student responses in a public setting. These data also showed negative relationships between the teacher use of the "ask other" strategy and gains; that is, the teachers who frequently relied on the feedback strategy of re-directing a question to another student when the first student answers incorrectly also tended to have lower gaining classes.

The remainder of this section of the report will summarize the process-product correlations by presenting behavioral profiles of effective teaching in reading and math in Title I classrooms.

Summary of Results: Effective and Ineffective Strategies in Chapter I Instruction

Reading

Across all grades, individualized instruction (defined as private, one-to-one interactions) and more allocation of time to academics were positively related to reading gains. Results also indicated that some degree of "challenge" in the lesson was related to higher gains -- seatwork difficulty, use of "higher-order" questions, and asking opinion questions were all positive-

ly correlated with reading gains. The teachers whose academic rates of interactions were relatively high in comparison to their non-academic rates tended to have higher gains in reading. Results also showed that some (infrequent) use of work-related criticism was positively related to gains while use of verbal praise was negatively related to gains. The findings from the analyses of the total sample also showed that "mild desists" were more effective than warnings, once a misbehavior has occurred.

In the elementary grades, the apparent effectiveness of individualized, one-to-one contacts is even more pronounced than in the total sample. The classes with the highest gains were observed spending a large portion of their time in academic activities, and, the teachers tended to work with 1 or 2 students at a time for extended periods of time. The use of opinion questions, the total number of interactions, and particularly the rate of private interactions were all found to correlate positively with gains. The consistency of the results that show private interactions as being associated with higher gains in the early grades suggest that the elementary grade data were primarily responsible for the positive relationships between individualized instruction and gains reported earlier, for the total sample.

In the upper grades (fifth through eighth), skills in the area of classroom management seem to become important predictors of the gains in reading. The teachers with the highest gaining

students were rated high on "withitness" (awareness of behavior problems and communication of that awareness), high on lesson momentum, and low on interruptions. Their students were attentive to the task at hand, and these teachers did not tend to spend a lot of time with 1 or 2 students at a time (they distributed their time equally across students). The apparent effectiveness of one-to-one instruction in the upper grades is much less evident than in the elementary grade analyses. This may reflect a developmental trend in which the "payoff" of private, one-to-one contacts is more apparent in the early grades (where more of the year-to-year variance in gain can be affected by instruction).

Math

In the math analyses using data from all grades, results suggested that small group, public interactions are associated with high gains. The overall interaction rate and student-initiated public interactions were positively correlated with math gains. Results across grades also showed that sustaining feedback (e.g. repeating the question for a student when he or she responds incorrectly) was apparently more effective than termination of questioning by moving on to another child. These analyses also indicated that when private interactions did occur, brief contacts were more effective than longer interactions.

In the elementary grades, the results for math showed that

the profile of an effective teacher was characterized by a smoothly running classroom -- transitions were brief and interruptions with the lesson were few. While the results in math generally showed less of a tendency for private interactions to be effective (in comparison to reading), the elementary grade findings did indicate that the teachers with the highest gains were observed, occasionally, spending extended periods of time with 1 or 2 students at a time. Classes with high gains did not tend to have high proportions of child-created private contacts that were social or that were very long, though they were characterized by procedural child-created contacts when needed (in preparation for the actual content-related interactions).

In the upper grades (5 through 8), the total amount of time and the total amount of time allocated to academics were positively associated with math gains (no particular grouping pattern was found to be more effective). Too much reliance on verbal praise was associated with low gains, while the occasional use of some work-related criticism was related to higher gains. Some degree of challenge in the content of the lesson appeared to be appropriate -- the classes with the higher gains were also found to have relatively high rates of student incorrect responses (i.e., greater than 20% wrong). The teachers in these classes apparently found it possible to handle students' mistakes in a non-threatening manner by sustaining the interaction until the student improved his or her response.

Conclusions and Recommendations

The results from this study have shown that some instructional strategies relate to higher gains across grade-levels and subject-matter areas. Other teaching methods are associated with increased student growth only in a particular grade-level or for reading or math, but not both. Results that appear to be generalizable across grade-levels and subject-matter show that the overall rate of interactions is positively related to student gain and that the greater the allocation of time to content-related discussion and interaction, the greater the observed gains. These findings agree with much of the "time-on-task" literature that shows that the more students are engaged with the content to be learned, the greater the achievement gains. This means that time set aside for transitions and other "non-academic" activities should be kept to a minimum.

There was also evidence that effective teachers in reading and in math at all grade levels were successful and vigilant monitors. Effective monitors initiated and received large numbers of contacts when students were involved in seatwork activities. They also apparently encouraged students to ask for help rather that letting them become frustrated. Results common to different contexts also portrayed the effective teacher as one who asks some difficult questions and may rely to some degree on work-related criticism. Those findings suggest that effective Title I teachers were the ones who maintained relatively hig

expectations and who communicated those expectations to the students.

Generic findings (those that hold up across grades and across subject matter areas) also included relations with gain for certain teacher feedback variables. When students answered correctly, the teachers with the highest gains did not over-use verbal praise. Praise, particularly in a public setting, is probably best used sparingly (for example, less than about 15% of the time when students answer correctly), and should be contingent on truly superior work. Too much praise will diminish its effectiveness as a reinforcer. When a student answers a question incorrectly, the "best" feedback strategies seem to be to sustain the interaction by repeating the question or by rephrasing the question or cluing the child. The feedback strategy consistently associated with low gains was the redirecting of a question to another student when the first student has responded incorrectly. This follows from the propostion that it is better to stay with a student and help him or her improve his or her response than to "give up" on the first student and move on to find someone else to answer the question.

In addition to the results that were consistent across grades and different subject matter areas, there were many findings that were "context-specific" in the sense that they apply only to upper or lower grades or only to reading or math. For example, one of the major differences between the profile of an

effective teacher in the early grades and the upper grades is that the elementary grade teachers with the highest gains were the ones who relied most heavily on private, one-to-one interactions, while effective teachers in grades 5 through 8 tend to rely relatively more on public interactions. It seems that, in developmental terms, low achieving students in the elementary grades are not "cognitively ready" for the demands created by public question and answer sessions; they respond best in one-to-one contacts with the teacher. Also we found that effective practices in the upper grades were more likely to include some non-academic activities. Apparently, by the time students reach fifth through eighth grades, effective teachers find it worthwhile to devote at least a small percentage of their time to activities designed to build and maintain rapport and encourage student initiative and involvement. In addition, the results indicated that the more effective teachers in the upper grades tended to be the better classroom managers, probably because behavior management is less of a problem with younger students. This is <u>not</u> to say that management skills (e.g., proactively avoiding problems before they even get started) are unimportant in the early grades, but rather that these skills are <u>more</u> crucial in the upper grades than in elementary school.

We also found some differences in the nature of effective strategies according to whether math or reading was being taught. In reading, individualization (i.e., private, one-to-one

interactions) is more important and productive than in math, where effective practices include use of small group instruction, public question-and-answer sessions, and encouragement of student-initiated, public questions and comments. Math activities were more effective if fast-paced, while effective teachers in reading made relatively more use of "higher-order" activities, like questions requiring comprehension and analysis. These differences arise because of the fundamental differences between reading and math content and goals. Reading gains are perhaps facilitated by individualized activity because even students who are on the same "level" of difficulty of material can be having dramatically different problems, because different "pieces" of the reading process are giving them trouble.

Math is more so an assemblage of algorithms and procedures that do not vary; it makes sense that individualization is less important in that context. Fast-paced activity and public discussions are effective in math because those methods facilitate overall content coverage. Successful reading requires much more than phonics and decoding skills; this is the reason that effective reading teachers made use of some "higher-order" cognitive activities like asking comprehension, analysis, and synthesis questions during discussions. Since those skills are assessed by the total reading subscale, it is reasonable that teachers who engage students in these activities tend to have the higher gaining classes.

The other studies of teaching effectiveness that examined the same kinds of process measures that we used were all done in "regular" classes, with a wide range of student ability, and with one teacher and around 25 or more students. This is much different from the ecology of the Title I lab in which one teacher and one aide are with 6 to 10 students at a time. The two contexts are so different that we should not be surprised by the fact that some of our results on effective behaviors do not agree with results from the other teaching effectiveness studies.

However, some results <u>did</u> agree with findings from the earlier studies by Brophy and Evertson (1976), Stallings and Kaskowitz (1974), Soar (1973), Anderson et al. (1979), and Crawford et al. (1978). For example, we found, as others have, that higher gains are associated with more interactions in general, and with more <u>academic</u> interactions in particular. More time allocated to content-related activities and less time to transitions, interruptions, and procedure-related matters was also indicative of a higher-gaining Title I lab. In agreement with some of the earlier work on effective strategies with lower achieving, lower SES students, we also found that teacher feedback that sustains the interaction (thereby allowing the student to improve his or her response) is preferable to the termination of the interaction by re-directing the question to another student.

One of the areas in which our results did not agree with

earlier studies' results concerns the effectiveness of individualization (private, one-to-one contacts). The studies by Brophy, Stallings, and others that were done in regular classrooms had shown that too much time with one student at a time was associated with lower gains, whereas our data showed positive correlations between private contacts and gains (especially in reading and in the lower grades). The discussions of the earlier studies' results had speculated that there was perhaps nothing "wrong" with extended private interactions, but that the reason for their negative correlations with gain was that the remaining 24 of the 25 students were not engaged and were not being monitored while the teacher was working with one student. As a general strategy, then, there would probably be less overall "time-on-task" in a regular-size class where the teacher spent a lot of time with one student at a time than in a class where the teacher conducted more whole group and small group activities.

However, the situation is different in Title I labs. When the adult-to-child ratio is only 1-to-4 or 1-to-5 (teacher and aide with 8-10 students), the strategy of extended, private teacher-student interactions is more feasible as a successful instructional approach. While the teacher is working individually with one student at a time, the aid can assist in monitoring the other students' progress. And, with a smaller number of students overall, it is less difficult for the teacher to look up

occasionally to maintain awareness of what the other students are doing.

Another area in which our results disagree somewhat with other studies concerns the findings for use of praise and criticism. The study by Brophy and Everson did yield some positive correlations for criticism and negative correlations for praise, but primarily in their middle SES sub-sample; the trend was for the correlations to be reversed (positive for praise and gains, negative for criticism and gains) in their lower SES sub-sample. It may be that their lower SES sub-sample correlations were spurious (their N of teachers was small when grouped by students' SES level), or that differences between their results and ours are due to differences between the "regular classroom" context and Title I labs, or, that we should broaden our thinking about the SES level of students served by Title I. Even though sites are selected for Title I services on the basis of school-wide SES data, the students actually served within schools are eligible only because of low achievement scores or because of teacher referral. We may be in error if we think of the Title I student population as homogenously "low" in SES. Whatever the underlying reasons, our results consistently showed higher gains (in reading and in math, across all grades) in association with some use of work-related criticism and with avoidance of too much praise. The more effective teachers in our study communicated high expectations through occasional criticism and refrained from

praise (in a public setting, particularly), unless it was truly called for.

In terms of qualifications or limitations of the results reported here, the main factor is that these teachers were teaching in Title I labs, and Title I is responsible for only about an hour per day of instruction, at most. It is possible that some of the results presented here might have been influenced by regular teacher effects. The main rejoinder to that criticism relies on our sampling procedure. Since we included nearly all of the Title I population in this study, the thousands of students entering into the analyses (broken down according to whichever Title I teacher they were assigned to) represent literally hundreds of regular teachers' classes. Simply because of the large Ns involved, one could expect that the regular teacher effect would balance out across our sample. Computing the correlation analyses does imply that we think that some Title I effect does exist, otherwise it would make no sense to establish linkages between what the Title I teacher does in the classroom and his or her students' observed gains. Our justification for assuming that some Title I effect exists rests primarily on the results (discussed in the introduction of this report) that show that, in general, the more time during which a student receives Title I instruction, the greater the gain.

The question of the degree of external validity, or generalizability, of the results is more problematic. Since we measured

virtually the entire OCPS population (of Title I classes), the generalizability to our district is not in question. However, the degree to which the findings could generalize beyond our district is questionable -- more studies are needed before we can be confident of the generality of the results beyond OCPS. Reasonably, one would expect that our findings would be most likely to generalize to a Title I-type of instructional setting (teacher and aide with a small number of students) in other urban school districts.

Recommendations

It is difficult to know how detailed to make the recommendations that come from the results presented here. Each one of the findings in the last section of the results (on correlations between processes and achievement gains) could be the basis for a formal recommendation that Title I students be instructed in a certain, specified manner. For example, consider the finding that shows elementary-grade students gain more in reading if the Title I teacher allocates more time to individualized, content-related activity. How much "more time"? By examining the means on the appropriate variables (in Appendix D), we can recommend that at least 40% - 50% of the class period ought to be individualized activity -- say, 12 to 15 minutes out of 30. And, at least 90% of that 12 to 15 minutes ought to be content-related, with a minimum of time allocated to transitions, interruptions, etc.

Instead of going over all of the results again in this "recommendation" format, let the recommendation be that such prescriptions about effective teaching ought to be developed from the earlier results. And, such prescriptions ought to be disseminated to the Chapter I teachers before or during the next academic year. Several recent studies have shown that even a "minimal" training format, such as sending written teacher training packets through the mail to teachers, can be effective, if teachers are convinced of the sound research basis of the recommendations. A checklist or self-test can be included in the packet for return back to central office, so that there will be some indication of attention to the content of the packet.

After the teachers are exposed to the training content, their teaching should be observed again to determine the degree to which the recommendations are being implemented. What should evolve is a "loop" model in which findings from the research are used as the basis for training, and continued observations are made for the purpose of indicating the degree to which training content should be altered (and the degree to which it is being implemented). Feedback from teachers about the usefulness and effectiveness of the research-based training will be valuable for improvement of the training. Additional observations will also permit us to replicate the earlier study; findings that emerge consistently across separate replication studies can be used with a relatively high degree of confidence.

The "process" or "formative" evaluation model that we have entered into will require continued cooperation between evaluators, teachers and aides, and central office administration. The payoff should be in greater academic growth for Chapter I students.

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APPENDIX A

LEXICON OF VARIABLE NAMES

Lexicon of Variables for Observational Study

Variable Name	Variable Meaning
TOTRO	Total Response Opportunities Given by Teachers
TOTPUBSP	Total Number of Social or Procedural Contacts Made by Teacher
TOTSI	Total Number of Student-Initiated Questions or Comments
TOTBR	Total Number of Mild and Severe Misbehaviors
TOTTAC	Total Number of Private Teacher-Initiated Contacts
TOTCCC	Total Number of Private Child-Initiated Contacts
TOTDYAD	Total Number of Dyadic Contacts
TOTPUBNB	Total Number of Non-Behavior Related Public Contacts
TOTPRINB	Total Number of Non-Behavior Related Private Contacts
TOTNB	Total Number of Non-Behavior Related Contacts
TOTAC	Total Number of Academic Contacts
TOTTIME	Total Amount of Time Observer is in the Classroom
TOTPRAIS	Total Number of Praises Given by the Teacher
TOTOPIN	Total Number of Opinion Responses
RATEDYAD	Number of Dyadic Contacts per minute
RATEAC	Number of Academic Dyadic Contacts per minute

RATENAC	Number of Non-Academic Dyadic Contacts per minute
PROPAC	The Proportion of All Dyadic Contacts that were Academic
PROPPUB	The Proportion of All Non-Behavior Related Contacts that were Public
PROPRI	The Proportion of All Non-Behavior Related Contacts that were Private
PROPRO	The Proportion of All Dyadic Contacts that were Response Opportunities
PROPUBSP	The Proportion of All Dyadic Contacts that were Public and Social or Procedural and Initiated by the Teacher
PROPSI	The Proportion of All Dyadic Contacts that were Student-Initiated Questions or Comments
PROPBR	The Proportion of All Dyadic Contacts that involved Misbehaviors
PROPTAC	The Proportion of All Dyadic Contacts that were Private Teacher-Initiated
PROPCCC	The Proportion of All Dyadic Contacts that were Private Student-Initiated
PPRAIS	The Proportion of All Dyadic Contacts that were Praise
POPIN	The Proportion of Response Opportunities that involved Student Opinions
PCORRECT	The Proportion of Response Opportunities that were Answered Correctly
PINCORR	The Proportion of Response Opportunities that were Answered Incorrectly
PDKNR	The Proportion of Response Opportunities where the Student gave a "don't know", or no response
PPRAISRO	The Proportion of Response Opportunities that involved Praise by the Teacher

PCRITRO	The Proportion of Response Opportunities that involved Criticism by the Teacher
PREPCLUE	The Proportion of Response Opportunities where the Teacher Rephrased the Question or Gave a Clue
PREP	The Proportion of Response Opportunities where the Teacher Repeated the Question
PAO	The Proportion of Response Opportunities where the Teacher Asked Another Student to Respond After the First Student Failed
PGIVEANS	The Proportion of Response Opportunities where the Teacher Gave the Answer since no Student Answered Correctly
PFDBK	The Proportion of Feedback given when the Students were Incorrect or did not Respond
PQSI	The Proportion of all Student Questions or Comments that were Questions
PCSI	The Proportion of all Student Questions or Comments that were Comments
PACC	The Proportion of all Student Questions or Comments that were Accepted
PNACC	The Proportion of all Student Questions or Comments that were Not Accepted
PACSI	The Proportion of all Student Questions or Comments that were Academic
PSPSI	The Proportion of all Student Questions or Comments that were Social or Procedural
PPRAISSI	The Proportion of all Student Questions or Comments that were Praised by the Teacher
PCRITSI	The Proportion of all Student Questions or Comments that were Criticized by the Teacher

PMILD	The Proportion of all Misbehaviors that were Mild
PSEVERE	The Proportion of all Misbehaviors that were Severe
PMD	The Proportion of all Misbehaviors that were given a Mild Desist by the Teacher
PWRN	The Proportion of all Misbehaviors that were given a Warning by the Teacher
PDA	The Proportion of all Misbehaviors that were Acted Upon Directly by the Teacher
PTARG	The Proportion of all Misbehaviors where the Teacher made a Target Error
PTIMING	The Proportion of all Misbehaviors where the Teacher made a Timing Error
POVERR	The Proportion of all Misbehaviors where the Teacher Overreacted
PACTAC	The Proportion of all Private Teacher-Initiated Contacts that were Academic
PSOTAC	The Proportion of all Private Teacher-Initiated Contacts that were Social
PPROTAC	The Proportion of all Private Teacher-Initiated Contacts that were Procedural
PBFTAC	The Proportion of all Private Teacher-Initiated Contacts that were Brief
PLGTAC	The Proportion of all Private Teacher-Initiated Contacts that were Long
PVLGTAC	The Proportion of all Private Teacher-Initiated Contacts that were Very Long
PPRAISTA	The Proportion of all Private Teacher-Initiated Contacts where the Teacher gave Praise
PCRITTAC	The Proportion of all Private Teacher-Initiated Contacts where the Teacher gave Criticism

PACCCC	The Proportion of all Private Child-Initiated Contacts that were Academic
PSOCCC	The Proportion of all Private Child-Initiated Contacts that were Social
PPROCCC	The Proportion of all Private Child-Initiated Contacts that were Procedural
PBFCCC	The Proportion of all Private Child-Initiated Contacts that were Brief
PLGCCC	The Proportion of all Private Child-Initiated Contacts that were Long
PVLGCCC	The Proportion of all Private Child-Initiated Contacts that were Very Long
PPRAISCC	The Proportion of all Private Child-Initiated Contacts where the Teacher gave Praise
PCRITCCC	The Proportion of all Private Child-Initiated Contacts where the Teacher gave Criticism
TOTI	The Total Number of Minutes the Teacher Spent with Individual Students
TOTSG	The Total Number of Minutes the Teacher Spent with Small Groups
TOTWG	The Total Number of Minutes the Teacher Spent with Whole Groups
TOTIMEAC	The Total Number of Minutes that were Academic
TOTNAC	The Total Number of Minutes that were Non-Academic
PROTIMAC	The Proportion of Elapsed Time that was Academic
PROPACI	The Proportion of all Individualized Time that was Academic

PROPACSG	The Proportion of all Small Group Time that was Academic
PROPACWG	The Proportion of all Whole Group Time that was Academic
ETTIME	The Total Amount of Elapsed Time
IAC	The Total Amount of Individualized Academic Time
INAC	The Total Amount of Individualized Non-Academic Time
SGAC	The Total Amount of Small Group Academic Time
SGNAC	The Total Amount of Small Group Non-Academic Time
WGAC	The Total Amount of Whole Group Academic Time
WGNAC	The Total Amount of Whole Group Non-Academic Time
MORATE	The Rating on Teacher Classroom Momentum
WITHRATE	The Rating on Teacher Classroom "Withitness"
MOVERATE	The Rating on Teacher Classroom Movement
INTRRATE	The Rating on Teacher Classroom Interruptions
ENTHRATE	The Rating on Teacher Classroom Enthusiasm
LNGTRATE	The Rating on Teacher Classroom Length of Transitions
SEATRATE	The Rating on Teacher Classroom Seatwork Difficulty
EQUPRATE	The Rating on Teacher Classroom Equipment and Materials Use

QUESRATE	The Rating on Teacher Classroom Utilization of High versus Low Order Questions
AIDERATE	The Rating on Degree of Aide Involvement
ATTNRATE	The Rating on the Degree of Classroom Attentiveness
DISTRATE	The Rating on Teacher Classroom Distribution of Time Among Students

APPENDIX B

CORRELATIONS OF ALL PROCESS VARIABLES WITH PROCESS "CRITERION" VARIABLES

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEDYAD	RATEAC	PROPAC
RATEDYAD	.206* .117 .213	.287** .507** .270	.189 .159 .216		.873** .808** .887**	.154 .255* .261
RATEAC	.345** .296* .372*	.327** .508** .234	.186 .132 .230	.873** .808** .877**		.577** .758** .651**
RATENAC	-.034 -.167 -.116	.139 .229 .201	.126 .105 .095	.806** .688** .714**	.416** .128 .310*	-.412** -.504** -.449**
PROPAC	.344** .284* .412**	.179 .230 .109	.088 .020 .169	.154 .255* .261	.577** .758** .651**	
PROPPUB	.307** .171 .399**	.134 .241 .056	.041 .062 -.025	.579** .688** .333*	.629** .656** .504**	.386** .364** .480**
PROPRI	-.307** -.171 -.399**	-.134 -.241 -.057	-.041 -.062 .025	-.579** -.688** -.333*	-.629** -.656** -.504**	-.386** -.364** -.480**
PROPRO	.424** .264* .562**	.197* .223 .192	.113 .070 .138	.377** .478** .302*	.625** .754** .564**	.693** .717** .700**
PROPUBSP	.054 -.018 .036	.113 .279* -.061	.110 .211 -.060	.501** .537** .129	.279** .169 .066	-.239* -.271* -.189
PROPSI	.117 .163 -.020	-.027 .008 -.174	-.121 -.032 -.302*	.462** .451** .293*	.357** .253* .303*	.024 -.033 .136
PROPBR	-.287** -.504** -.092	-.240* -.211 -.270	-.296** -.321* -.333*	.277** .283* -.028	.068 .012 -.173	-.303** -.238 -.383*
PROPTAC	-.344** -.180 -.465**	-.114 -.230 -.024	-.006 -.004 .035	-.537** -.655** -.305*	-.555** -.588** -.422**	-.270** -.268* -.324*
PROPCCC	-.187* -.088 -.223	-.098 -.186 -.047	-.031 -.071 .049	-.532** -.642** -.283	-.597** -.644** -.456**	-.421** -.413** -.500**

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PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEYAD	RATEAC	PROPAC
PPRAIS	.193* .146 .194	.091 .154 .035	.102 .095 .069	.200* .039 -.009	.294** .205 .131	.267** .287* .334*
TOTOPIN	.324** .317* .400**	.107 .070 .334*	-.048 -.182 .257	.206 .109 .229	.277** .204 .354*	.206* .197 .381*
POPIN	.280** .296* .245	.078 .050 .178	.007 -.099 .190	.012 -.095 .002	.030 -.069 .114	.034 -.040 .232
PCORRECT	.003 .198 -.165	-.019 .080 -.094	.136 .112 .143	.120 .007 .122	.158 .098 .157	.103 .054 .168
PINCORR	-.286** -.452** -.071	-.131 -.153 -.110	-.223* -.126 -.324*	-.003 .085 -.027	.020 .106 -.034	.006 .202 -.106
PDKNR	.072 .015 .134	.079 .056 .103	.016 .165 -.007	-.130 -.035 -.099	-.196* -.305* -.154	-.173 -.444** -.153
PPRAISRO	-.014 .118 -.178	-.104 .053 -.273	-.046 .151 -.249	-.021 -.092 -.243	.009 .012 -.193	-.030 .078 -.101
PCRITRO	-.153 -.245 .108	.045 .063 .083	-.062 -.110 .000	.159 .075 .009	.122 .042 .171	.021 .022 .316*
PREPCLUE	-.239* -.481** -.021	-.145 -.258* -.014	-.233* -.285* -.202	.007 -.041 -.067	.032 .002 -.011	.073 .146 .022
PREP	-.111 -.164 -.058	-.087 .007 -.201	-.125 .105 -.335*	.046 .070 .061	-.041 -.016 -.076	-.157 -.040 -.275
PAO	.058 .066 .044	.119 .043 .236	.171 .195 .141	.112 .040 .285	.079 .018 .187	.052 .049 .062
PGIVEANS	-.152 -.196 -.103	-.131 -.112 -.167	.013 .084 -.036	-.093 .084 -.263	-.150 -.071 -.226	-.100 -.178 -.049
PFDBK	-.169 -.240 -.105	-.209* -.257* -.151	-.004 .041 -.055	-.015 -.033 -.106	-.028 -.060 -.064	.004 -.041 .058

BEST COPY AVAILABLE

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEYAD	RATEAC	PROPAC
PQSI	-.101 -.014 -.124	.004 -.107 .100	-.016 -.049 .081	-.152 -.051 .032	-.186 -.066 -.141	-.161 -.041 -.315*
PCSI	.101 .014 .124	-.004 .107 -.100	.016 .049 -.081	.152 .051 -.032	.186 .006 .141	.161 .041 .315*
PACC	.031 .126 -.017	.013 -.193 .200	.143 .114 .197	-.028 -.144 .244	.055 .018 .227	.163 .194 .135
PNACC	-.066 -.126 -.071	-.044 .193 -.281	-.148 -.114 -.236	.127 .144 -.122	.044 -.018 -.074	-.063 -.194 .069
PACSI	.182 .107 .280	.071 .198 -.071	-.182 -.249 -.115	.218* .254* .436**	.416** .462** .592**	.540** .475** .596**
PSPSI	-.185 -.113 -.280	-.070 -.196 .071	.184 .253* .115	-.217* -.250 -.436**	-.415** -.462** -.592**	-.541** -.477** -.596**
PPRAISSI	.220* .248 .193	.231* .231 .229	.156 .162 .160	.234* .286* .355*	.256* .284* .324*	.148 .137 .168
PCRITSI	-.170 -.246 -.135	-.015 .143 -.233	-.203* -.039 -.471**	.239* .336* -.074	.097 .099 -.084	-.127 -.137 -.096
PMILD	.014 .350* -.057	.006 -.079 .030	.141 -.174 .176	.092 -.330* -.079	.016 -.032 -.188	-.171 .203 -.256
PSEVERE	-.014 -.350* .057	-.006 .079 -.030	-.141 .174 -.176	-.092 .330* .079	-.016 .032 .188	.171 -.203 .256
PMD	-.048 .173 -.243	.037 .147 -.027	.089 .296* -.060	-.042 -.042 -.390*	-.078 -.034 -.374*	-.084 -.009 -.126
PWRN	-.125 -.107 -.136	.004 .006 -.002	-.032 -.097 .025	.042 .202 .001	-.015 .160 -.137	-.100 .051 -.210
PDA	.110 -.272* .336*	-.064 -.325* .031	-.078 -.380** .053	.002 -.304* .427*	.073 -.264* .480**	.133 -.137 .245

BEST COPY AVAILABLE

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEYAD	RATEAC	PROPAC
PTARG	-.053 -.146 .026	-.017 -.158 .075	-.251* -.122 -.325*	-.125 -.160 .008	-.116 -.104 -.043	-.045 -.046 -.057
PTIMING	-.142 -.134 -.106	-.290** -.241 -.416*	-.322** -.249 -.361*	-.206* -.246 -.011	-.200* -.236 -.037	-.070 -.155 -.010
POVERR	-.115 -.350* -.102	-.089 .079 -.192	-.137 .174 -.201	-.059 .330* -.001	-.070 .032 -.019	-.022 -.203 -.015
PACTAC	-.047 -.009 -.085	.061 .105 -.009	-.048 -.183 .116	.110 .167 .177	.325** .392** .402**	.545** .498** .602**
PSOTAC	.117 -.009 .309*	-.111 -.193 -.011	-.087 -.010 -.158	-.204* -.291* .029	-.213* -.383** .156	-.041 -.331* .271
PPROTAC	-.003 .014 -.048	-.015 -.026 .014	.089 .201 -.049	-.024 -.048 -.191	-.245* -.250 -.474**	-.552** -.387** -.726**
PBFTAC	.131 .237 -.124	.147 .222 .122	.095 .036 .116	.446** .357** .154	.303** .193 .050	-.175 -.090 -.264
PLGTAC	-.013 -.182 .225	.071 .051 .071	-.018 .046 -.051	-.056 .095 .102	-.016 .115 .078	.095 .071 .077
PVLGTAC	-.154 -.183 -.031	-.244* -.352* -.199	-.117 -.091 -.098	-.556** -.562** -.274	-.387** -.331* -.133	.175 .096 .237
PPRAISTA	.153 .090 .189	.061 .111 .018	.070 -.009 .164	.242* .036 .221	.316** .170 .327*	.249* .252* .357*
PCRITTAC	-.276** -.425** -.071	.063 .043 .204	-.040 -.003 -.223	.294** .268* .195	.155 .068 .164	-.033 -.070 .100
PACCCC	.181 .101 .218	.143 .271* .007	.057 .010 .073	.368** .378** .146	.558** .629** .353*	.540** .662** .473**
PSOCCC	-.056 -.014 .129	.024 .002 .066	-.142 .040 -.383*	-.113 -.322* .056	-.133 -.251 -.056	-.168 -.103 -.244

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEYAD	RATEAC	PROPAC
PPROCCC	-.169 -.102 -.180	-.159 -.291* -.030	-.007 -.026 .061	-.344** -.277* -.172	-.536** -.573** -.346*	-.504** -.688** -.404**
PBFCCC	-.111 .12* -.480**	-.067 .094 -.267	.006 .132 -.185	.385** .335* .263	.232* .159 .085	-.179 -.077 -.275
PLGCCC	.099 -.116 .348*	.038 -.118 .200	-.120 -.151 -.072	-.205* -.134 -.174	-.117 -.039 -.072	.094 .012 .153
PVLGCCC	.044 -.064 .200	.062 -.003 .106	.166 -.017 .363*	-.351** -.421** -.133	-.217* -.223 -.021	.168 .137 .178
PPRAISCC	.085 .059 .010	.148 .272 -.015	.065 .118 -.091	.337** .232 -.016	.313** .223 .054	.075 .069 .168
PCRITCCC	-.046 -.081 -.103	-.245* -.347* .076	-.313** -.435** -.209	.103 -.068 -.029	.023 -.128 -.046	-.076 -.084 -.033
MORATE		.496** .510** .518**	.403** .355** .441**	.206* .117 .218	.345** .296* .372*	.334** .284* .412**
WITHRATE	.496** .510** .518**		.532** .546** .541**	.287** .507** .270	.327** .508** .234	.179 .230 .109
MOVERATE	-.027 .024 -.050	.204* .133 .287*	.080 .023 .157	.037 -.053 .426**	-.002 -.080 .268	-.062 -.093 -.046
INTRRATE	-.327** -.398** -.255	-.220* -.155 -.315*	-.461** -.452** -.467**	-.138 -.068 -.148	-.281** -.201 -.380*	-.408** -.226 -.572**
ENTHRATE	.373** .361** .374*	.487** .553** .441**	.147 .187 .099	.268** .178 .448**	.326** .342* .340*	.191* .329* .077
LNGTRATE	-.370** -.408** -.300*	-.393** -.450** -.346*	-.542** -.405** -.685**	-.218* -.273* -.054	-.318** -.390** -.167	-.255* -.299* -.230
SEATRATE	.081 -.097 .199	-.040 -.054 .010	-.087 -.336* .115	.296** .127 .284*	.278** .070 .363*	.159 .042 .314*

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEDYAD	RATEAC	PROPAC
EQUPRATE	.067 -.176 .280	.011 -.243 .357*	.189* -.007 .368*	.068 -.198 .188	-.074 -.299* -.003	-.292** -.285* -.287*
QUESRATE	.239* .219 .346*	.207* .096 .338*	.187* .055 .377*	.005 .034 .457**	.167 .200 .537**	.347** .280* .406**
AIDERATE	-.079 -.328* -.035	-.172 -.053 -.268	.072 -.065 .116	.233* -.045 -.045	.198* -.022 .009	.104 .078 .190
ATTNRATE	.403** .355** .441**	.532** .546** .541**		.189* .159 .216	.186 .132 .230	.088 .020 .169
DISTRATE	.416** .627** .187	.591** .736** .383*	.314** .286* .356*	.315** .535** .292*	.310** .434** .293*	.145 .068 .227
ETTIME	-.013 .250 -.086	-.004 -.066 -.047	-.050 -.01[illegible] -.027	-.340** -.145 -.160	-.295** -.111 -.178	-.111 -.082 -.190
OBSSTMIN	.079 .151 -.093	-.119 -.162 -.002	-.141 -.184 -.136	.227* .041 .284	.152 -.003 .176	-.087 -.080 -.072
MAXSTMIN	.120 .159 -.041	-.108 -.139 -.002	-.117 -.186 -.093	.230* -.002 .288*	.173 -.020 .158	-.114 -.076 -.147
TOTPROSM	.084 .084 .090	.126 -.009 .233	.068 .096 .062	.099 .297* .019	.069 .222 -.015	-.024 .087 -.071
IAC	-.282** -.211 -.348*	-.117 -.149 -.091	-.175 -.231 -.083	-.440** -.475** -.430**	-.429 -.375** -.500**	-.223* -.142 -.359*
INAC	-.284** -.211 -.330*	-.326** -.253* -.444**	-.379** -.318* -.424**	-.414** -.600** -.266	-.409** -.487** -.328*	-.237* -.195 -.292*
SGAC	.055 .014 -.022	-.040 .054 -.145	-.145 -.124 -.304*	.489** .343* .304*	.467** .341* .329*	.148 .211 .165
SGNAC	-.018 .016 -.235	-.128 -.078 -.193	-.177 -.197 -.280	.340** .114 .255	.264** .061 .221	-.004 .059 -.045

PROCESS CRITERION VARIABLES

PROCESS	MDRATE	WITHRATE	ATTNRATE	RATEDYAD	RATEAC	PROPAC
WGAC	.303**	.216*	.189*	.136	.258*	.355**
	.285* .350*	.237 .206	.268* .146	.201 .309*	.273* .454**	.238 .443**
WGNAC	.132	.062	.053	.423**	.420**	.162
	.069 .149	.028 .205	-.037 .145	.273* .422**	.274* .459**	.136 .294*
TOTI	-.300**	-.159	-.220*	-.464**	-.453**	-.240*
	-.217 -.384*	-.168 -.174	-.250 -.163	-.507** -.446**	-.401** -.522**	-.154 -.387*
TOTSG	.049	-.051	-.153	.488**	.460**	.136
	.015 -.045	.040 -.157	-.137 -.315*	.329* .313*	.3[illegible] .333*	.201 .[illegible]
TOTWG	.307**	.213*	.186	.212*	.324**	.362**
	.273* .348*	.219 .220	.230 .156	.253* .345*	.318* .486**	.249 .455**
TOTIMEAC	-.026	-.004	-.197*	.106	.191*	.174
	-.06[illegible] -.044	.026 -.015	-.249 -.183	-.092 .089	.079 .171	.206 .173
TOTNAC	-.154	-.293**	-.367**	.116	.081	-.087
	-.105 -.302*	-.232 -.362*	-.411** -.404**	-.191 .056	-.129 .007	-.008 -.133
PROTIMAC	.157	.321**	.319**	-.114	.032	.166
	.055 .320*	.287* .366*	.312* .387*	.173 -.063	.197 .021	.122 .184
PROPACI	.071	.228*	.276**	.240*	.197*	.091
	-.133 .234	.070 .409**	.068 .444**	.357** .197	.200 .221	-.024 .185
PROPACSG	.126	.246*	.043	.040	-.030	-.130
	.079 .352	.[illegible]0* .149	.068 .045	.136 -.030	-.023 .086	-.303* .314
PROPACWG	.125	.017	.117	-.229*	-.229*	-.061
	.108 .324	-.063 .155	.221 -.065	-.056 -.096	-.138 -.033	-.155 .021
TOTRO	.357**	.258*	.123	.658**	.833**	.562**
	.258* .524**	.353** .205	.066 .178	.597** .557**	.828** .750**	.677** .647**
TOTPUBSP	.071	.182	.104	.764**	.556**	-.05[illegible]
	-.062 .164	.326* .047	.073 .095	.714** .539**	.391** .505**	-.096 .095

PROCESS CRITERION VARIABLES

PROCESS	MORATE	WITHRATE	ATTNRATE	RATEDYAD	RATEAC	PROPAC
TOTSI	.121 .085 .035	.061 .170 -.082	-.036 -.070 -.1[illegible]7	.703** .628** .546**	.574** .431** .536**	.064 .057 .227
TOTBR	-.245* -.445** -.173	-.067 -.017 -.199	-.174 -.246 -.346*	.614** .537** .376*	.409** .268* .223	-.115 -.090 -.196
TOTTAC	-.154 -.140 -.314*	.071 .095 .099	-.024 -.088 -.005	.268** -.075 .436**	.216* -.041 .305*	-.029 .011 -.039
TOTCCC	-.052 .001 -.219	.048 .093 .015	-.107 -.171 -.077	.151 -.185 .365*	.069 -.180 .182	-.167 -.126 -.204
TOTDYAD	.139 .056 .095	.205* .403** .121	.021 -.076 .025	.861** .754** .814**	.810** .718** .786**	.221* .358** .309*
TOTPUBNB	.267** .176 .364*	.216* .368** .109	.085 .035 .087	.813** .787** .618**	.819** .777** .726**	.333** .420** .486**
TOTPRINB	-.118 -.087 -.288*	.065 .101 .066	-.064 -.135 -.038	.234* -.133 .427**	.164 -.110 .266	-.091 -.053 -.116
TOTNB	.177 .128 .108	.226* .433** .136	.043 -.043 .048	.845** .722** .808**	.815** .725** .789**	.249* .396** .328*
TOTAC	.263** .217 .259	.271** .436** .164	.064 -.017 .107	.765** .636** .770**	.910** .876** .898**	.549** .728** .619**
TOTTIME	-.058 -.079 -.107	-.065 -.021 -.096	-.251* -.298* -.255	.118 -.114 .092	.188* .050 .156	.139 .185 .128
TOTPRAIS	.197* .148 .231	.189* .302* .123	.064 .044 -.004	.547** .340* .525**	.610** .485** .620**	.288** .397** .445**

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
RATEDYAD	-.015 -.033 -.106	-.114 .173 -.063	.240* .357** .197	.040 .136 -.030	-.229* -.056 -.096
RATEAC	-.028 -.060 -.064	-.032 .197 .021	.197* .200 .221	-.030 -.023 .086	-.229* -.138 -.033
RATENAC	.007 .017 -.112	-.173 .049 -.161	.212* .365** .071	.108 .247 -.237	-.142 .068 -.139
PROPAC	.004 -.041 .058	.166 .122 .184	.091 -.024 .185	-.130 -.303* .314	-.061 -.155 .021
PROPPUB	.285** .138 .429*	-.115 .118 -.173	.028 .233 -.157	.038 .077 .013	.108 .093 .339
PROPRI	-.285** -.138 -.429*	.115 -.118 .173	-.028 -.233 .157	-.038 -.077 -.013	-.108 -.093 -.339
PROPRO	.169 .044 .280	.030 .189 -.026	.011 .045 -.025	-.037 -.063 .070	.122 .038 .281
PROPUBSP	.258* .091 .451*	-.192* -.067 -.168	.098 .324* -.134	.118 .217 -.038	-.070 -.018 .193
PROPSI	.246* .173 .343*	-.199* .001 -.292*	-.024 .191 -.258	.058 .115 -.068	.101 .155 .222
PROPER	-.056 .183 -.399*	-.162 .053 -.289*	-.014 .259* -.326*	.062 .096 .022	-.056 .031 -.001
PROPTAC	-.237* -.104 -.366*	.112 -.136 .185	.036 -.210 .244	-.060 -.150 .129	-.163 -.127 -.423*
PROPCCC	-.265* -.198 -.319*	.111 -.081 .133	-.088 -.234 .038	-.016 .018 -.208	-.007 -.027 -.156
PPRAIS	.009 .000 .222	-.235* -.308 -.046	-.016 -.058 -.002	-.171 -.185 -.041	-.174 .024 -.259

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
TOTOPIN	-.101 -.251 .202	-.202* -.358** .143	.036 -.055 .234	.032 .049 .022	-.071 -.069 .094
POPIN	-.161 -.421** .249	-.155 -.378** .215	.065 -.031 .206	.022 .034 .042	.018 -.003 .180
PCORRECT	.509** .227 .689**	-.170 .111 -.293	-.090 -.036 -.140	-.013 .128 -.256	-.091 .038 -.454*
PINCORR	.259* .281* .254	-.100 .180 -.378*	-.167 .007 -.318*	-.076 -.188 .217	.022 -.114 .249
PDKNR	-.636** -.375** -.793**	.327** -.004 .418**	.186 .108 .248	.070 .047 .118	.141 .153 .433*
PPRAISRO	.242* .103 .353*	-.214* -.153 -.219	-.048 .103 -.184	-.101 -.084 -.136	-.125 .065 -.341
PCRITRO	-.012 -.026 -.048	-.007 .028 .095	-.013 -.078 .212	-.029 -.007 -.247	-.163 -.160 .131
PREPCLUE	.239* .268* .210	.008 .091 -.028	-.099 .051 -.222	-.004 -.134 .249	-.133 -.208 .293
PREP	.276** .318* .246	-.200* .291* -.571**	-.202* .126 -.444**	.026 .025 .030	-.084 -.177 -.022
PAO	.231* .223 .241	-.135 -.036 -.227	-.132 -.143 -.133	-.259* -.246 -.317	.084 .125 -.004
PGIVEANS	.293** .323* .282	.112 .104 .098	.043 .082 .037	.020 .017 .065	.258* .157 .405*
PFDBK		-.037 .220 -.211	-.139 .105 -.329*	.015 .008 .052	.054 -.017 .279
PQSI	.115 .054 .200	.196* .000 .278	.142 .087 .222	.106 .194 -.234	.121 .013 .115

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
PCSI	-.115 -.054 -.200	-.196* .000 -.278	-.142 -.087 -.222	-.106 -.194 .234	-.121 -.013 -.115
PACC	.377** .330* .433*	-.229* -.111 -.340*	-.155 -.051 -.210	-.111 -.089 -.192	.004 .016 -.153
PNACC	-.377** -.330* -.433*	.143 .111 .235	.120 .051 .149	.111 .089 .192	-.004 -.016 .153
PACSI	-.078 -.076 -.080	.037 -.101 .115	.001 -.021 .021	-.031 -.012 -.115	.060 -.123 .358*
PSPSI	.078 .076 .080	-.038 .100 -.115	.000 .022 -.021	.031 .012 .115	-.059 .124 -.358*
PPRAISSI	.060 .035 .104	-.166 -.228 -.120	.013 .002 .036	-.126 -.134 -.087	.011 .065 -.148
PCRITSI	-.028 -.198 .189	-.104 .036 -.190	-.035 .093 -.184	.060 .122 -.074	-.200 -.131 -.097
PMILD	.025 .049 .013	-.020 .010 .028	.142 -.222 .160	.002 .001 .038	-.158 -.131 -.187
PSEVERE	-.025 -.049 -.013	.020 -.010 -.028	-.142 .222 -.160	-.002 -.001 -.038	.158 .131 .187
PMD	-.086 -.020 -.146	-.049 .132 -.071	-.092 .080 -.204	.020 .067 .005	-.084 .107 -.042
PWRN	.129 .124 .143	-.001 -.079 .024	.093 -.007 .156	.013 .026 .020	-.047 .2 -.112
PDA	.007 -.198 .086	.046 -.187 .066	.045 -.199 .144	-.020 -.099 -.008	.124 -.016 .102
PTARG	-.016 .125 -.063	-.097 -.032 -.165	-.056 -.131 -.007	.088 .104 .087	-.043 -.098 -.080

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
PTIMING	.021 -.282* .266	-.132 -.224 -.132	-.303** -.183 -.356	-.012 -.132 .163	.180 -.220 .339
POVERR	.043 -.049 .076	-.020 -.010 -.058	.032 .222 .045	-.008 -.001 ---	.085 .131 .029
PACTAC	-.002 .054 -.071	.111 -.026 .228	.222* .153 .297*	-.009 -.142 .363	-.379** -.411** -.372*
PSOTAC	.031 .071 .007	.000 .030 -.082	-.032 -.110 .039	.122 .141 .040	.169 .181 .044
PPROTAC	-.012 -.090 .068	-.116 .015 -.195	-.220* -.125 -.317*	-.044 .092 -.394*	.320** .356* .367*
PBFTAC	-.015 -.065 -.002	-.173 -.137 .046	.045 .000 .060	.061 .149 -.124	-.021 .158 -.030
PLGTAC	.029 .061 .021	.069 .222 -.133	-.046 .086 -.135	.018 -.020 .095	-.045 -.107 -.263
PVLGTAC	-.010 .035 -.017	.186 .038 .165	-.035 -.090 .042	-.095 -.206 .064	.095 -.095 .196
PPRAISTA	.033 .016 .027	-.234* -.371** .030	.027 -.054 .111	-.132 -.159 .054	-.219* -.132 -.143
PCRITTAC	-.197* -.184 -.371*	-.017 .046 -.004	.164 .167 .226	-.192 -.218 .005	-.011 .070 -.132
PACCCC	-.011 .024 -.078	.128 .174 .227	.240* .218 .263	-.153 -.314* .355	-.216* -.181 -.009
PSOCCC	-.082 -.062 -.111	-.055 -.053 -.038	-.051 -.058 -.052	.109 .136 .019	.002 -.004 .150
PPROCCC	.041 -.001 .119	-.114 -.165 -.222	-.234* -.205 -.255	.119 .275* -.384*	.219* .194 -.035

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
PBFCCC	.006 .125 -.143	-.107 .098 -.177	.101 .354* -.137	.050 .042 .129	-.070 .122 -.215
PLGCCC	.037 -.040 .122	-.084 -.096 -.147	-.199* -.253 -.154	-.054 .044 -.342	.095 -.066 .213
PVLGCCC	-.061 -.167 .043	.319** -.002 .453**	.127 -.274* .406**	-.017 -.158 .265	.036 -.053 .004
PFRAISCC	.032 -.023 .080	-.269** -.267* -.155	-.160 -.280* -.103	.029 .069 .008	-.343** -.267 -.209
PCRITCCC	-.099 .054 -.551**	.054 .061 .291*	.056 -.016 .192	-.266* -.345* .169	.101 .212 ---
MORATE	.169 -.240 -.105	.157 .055 .320*	.071 -.133 .234	.126 .079 .352	.125 .108 .324
WITHRATE	-.209* -.257* -.151	.321** .287* .366*	.228* .070 .409**	.246* .280* .149	.017 -.063 .155
MOVERATE	-.172 -.189 -.146	-.146 -.213 -.156	.006 -.044 .054	.055 .127 -.163	-.305** -.472** -.196
INTRRATE	-.094 -.121 -.067	-.139 -.142 -.219	-.146 -.092 -.173	-.138 -.046 -.384*	-.006 .039 -.228
ENTHRATE	-.152 -.259* -.051	-.057 .060 -.107	.002 .092 -.069	.154 .260 -.062	.046 .000 .141
LNGTRATE	.070 .008 .153	-.355** -.322* -.470**	-.377** -.223 -.513**	.008 .094 -.235	.019 -.100 .231
SEATRATE	-.236* -.175 -.329	.145 .224 .219	.159 .069 .218	-.126 -.150 -.011	-.198 -.192 -.117
EQUPRATE	.160 .257* .046	.081 .136 .118	.137 .112 .148	.031 .096 -.074	.057 .218 -.090

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
QUESRATE	-.083 -.131 -.009	-.003 -.233 .073	-.031 -.172 .104	.073 .102 -.060	.268* .101 .403*
AIDERATE	.123 -.028 .202	.097 .128 .274	.168 .214 .137	.045 -.061 .329	-.346** -.331* -.184
ATTNRATE	-.004 .041 -.055	.319** .312* .387*	.276** .068 .444**	.043 .068 .045	.117 .221 -.065
DISTRATE	-.257* -.256* -.258	.162 .160 .162	.250* .070 .422**	.112 .206 -.109	.019 .052 -.164
ETTIME	-.137 -.110 -.138	.135 .036 .050	.081 -.096 .207	.253* .250 .328	.106 .147 -.172
IAC	-.127 -.190 -.037	-.028 -.127 -.010	-.144 -.187 -.099	-.074 -.079 -.120	-.107 -.210 .022
INAC	.057 -.256* .331*	-.565** -.396** -.770**	-.828** -.689** -.926**	-.040 -.005 -.173	-.004 -.237 .207
SGAC	.142 .166 .095	-.153 .035 -.171	.056 .120 -.047	.219* .225 .302	-.420** -.332* -.349
SGNAC	.072 .024 .117	-.318** -.123 -.464**	-.021 .043 -.158	-.338** -.225 -.763**	-.133 .019 -.202
WGAC	.069 .022 .117	.127 .202 .063	.135 .306* .041	-.013 .004 -.043	.571** .675** .458*

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
WGNAC	-.085 -.042 -.209	-.373** -.452** -.217	.271** .312* .252	.201 .266* .071	-.307** -.193 -.435*
TOTI	-.104 -.205 .043	-.118 -.167 -.166	-.268** -.262* -.280	-.073 -.072 -.147	-.097 -.220 .063
TOTSG	.140 .156 .102	-.176 .018 -.209	.050 .115 -.060	.160 .180 .182	-.402** -.304* -.351*
TOTWG	.047 .008 .084	.042 .059 .032	.180 .357** .071	.033 .074 -.030	.485** .570** .385*
TOTIMEAC	.062 -.046 .175	-.087 .011 -.084	.003 .103 -.096	.130 .146 .067	-.099 -.183 .244
TOTNAC	.025 -.233 .243	-.888** -.789** -.955**	-.510** -.270* -.761**	-.056 .095 -.415*	-.315** -.352* -.134
PROTIMAC	-.037 .220 -.211		.599** .416** .764**	.085 -.070 .389*	.321** .330* .254
PROPACI	-.139 .105 -.329*	.599** .416** .764**		-.001 -.041 .104	.023 .244 -.209
PROPACSG	.015 .008 .052	.085 -.070 .389*	-.001 -.041 .104		-.271* -.287* -.223
PROPACWG	.054 -.017 .279	.321** .330* .254	.023 .244 -.209	-.271* .287* -.223	
TOTRO	.083 -.014 .239	.022 .229 .020	.114 .131 .086	.056 .099 .013	-.061 -.022 .255
TOTPUBSP	.137 .053 .355*	-.155 -.029 -.059	.242* .418** .034	.077 .151 -.037	-.211 -.125 .181
TOTSI	.163 .145 .221	-.159 .002 -.162	.134 .282* -.103	.081 .138 .009	-.088 .016 .192

PROCESS CRITERION VARIABLES

PROCESS	PFDBK	PROTIMAC	PROPACI	PROPACSG	PROPACWG
TOTBR	.031 .114 -.353*	-.146 .086 -.452**	.179 .399** -.321*	.082 .126 .056	-.138 -.003 -.127
TOTTAC	-.164 -.128 -.270	-.212* -.194 -.110	.100 .047 .139	.011 .037 -.017	-.425** -.401** -.312
TOTCCC	-.263* -.318* -.245	-.222* -.144 -.218	-.056 -.023 -.129	.045 .126 -.215	-.284* -.286* -.125
TOTDYAD	.011 -.056 .023	-.195* .040 -.179	.180 .345* .019	.095 .205 -.066	-.322** -.251 .028
TOTPUBNB	.141 .058 .291	-.080 .137 -.050	.172 .291* .027	.082 .156 .003	-.123 -.041 .259
TOTPRINB	-.222* -.228 -.273	-.232* -.188 -.165	.035 .018 .025	.027 .080 -.103	-.393** -.385** -.244
TOTNB	.008 -.077 .049	-.190* .029 -.154	.171 .307* .040	.091 .199 -.071	-.325** -.267 .037
TOTAC	-.006 -.076 .034	-.105 .096 -.073	.151 .192 .107	.062 .108 .056	-.309** -.268 .004
TOTTIME	.058 -.090 .224	-.266** -.150 -.287*	-.104 .040 -.254	.096 .140 -.107	-.154 -.231 .190
TOTPRAIS	.090 .018 .283	-.273** -.257* -.136	.064 .085 -.018	-.032 .007 -.082	-.278* -.179 -.073

APPENDIX C

CORRELATIONS OF PROCESS MEASURES WITH STUDENT ACHIEVEMENT GAINS

TABLE 1. READING - RELATIONSHIPS ACROSS ALL GRADES

VARIABLE	SPRSPRR	ADJGAINR
The total amount of individualized academic time	.227 p=.037	.228 p=.036
The total number of minutes the teacher spent with individual students	.219 p=.042	.220 p=.042
The total number of minutes that were academic	.239 p=.030	.277 p=.014
The proportion of all individualized time that was academic	-.188 p=.088	-.209 p=.067
The rating on teacher classroom "withitness"	-.250 p=.024	-.219 p=.042
The rating on teacher classroom enthusiasm	-.231 p=.034	-.194 p=.064
The rating on teacher classroom seatwork difficulty	.295 p=.009	.303 p=.008
The rating on teacher classroom utilization of high vs. low order questions	.123 p=.173	.211 p=.051
The total number of private child initiated contacts	.293 p=.010	.284 p=.012
The total number of non-behavior related private contacts	.217 p=.044	.212 p=.048
The total number of non-behavior related contacts	.151 p=.119	.165 p=.098
The total number of academic contacts	.139 p=.139	.170 p=.091
The total amount of time observer is in the classroom	.237 p=.030	.277 p=.014

TABLE 1., cont'd.:

VARIABLE	SPRSPRR	ADJGAINR
Number of non-academic dyadic contacts per minute	-.118 p=.178	-.164 p=.100
The total number of opinion responses	.106 p=.205	.176 p=.084
The proportion of response opportunities that involved praise by the teacher	-.219 p=.048	-.286 p=.014
The proportion of response opportunities where the teacher asked another student to respond after the first student failed	-.260 p=.023	-.254 p=.026
The proportion of all misbehaviors that were given a mild desist by the teacher	.264 p=.028	.231 p=.048
The proportion of all misbehaviors that were given a warning by the teacher	-.315 p=.011	-.225 p=.052
The proportion of all private teacher initiated contacts that were social	.186 p=.076	.175 p=.089
The proportion of all private teacher initiated contacts where the teacher gave criticism	-.137 p=.146	-.181 p=.081
The proportion of all private child initiated contacts where the teacher gave criticism	.263 p=.020	.259 p=.022
The ratio of number of academic interactions per minute divided by the number of non-academic interactions per minute	.114 p=.187	.172 p=.089

TABLE 2. READING - RELATIONSHIPS FOR ELEMENTARY GRADES

VARIABLE	SPRSPRR	ADJGAINR
The total amount of individualized academic time	.337 p=.019	.300 p=.033
The total amount of individualized non-academic time	.300 p=.033	.313 p=.028
The total amount of small group academic time	.123 p=.230	.214 p=.099
The total number of minutes the teacher spent with individual students	.343 p=.017	.312 p=.028
The total number of minutes the teacher spent with small groups	.123 p=.231	.218 p=.094
The total number of minutes that were academic	.327 p=.023	.354 p=.015
The total number of minutes that were non-academic	.258 p=.059	.304 p=.032
The proportion of all individualized time that was acadmeic	-.259 p=.084	-.299 p=.054
The proportion of all small group time that was academic	-.168 p=.179	-.263 p=.073
The rating on teacher classroom momentum	-.242 p=.072	-.172 p=.151
The rating on teacher classroom "withitness"	-.513 p=.001	-.506 p=.001
The rating on teacher classroom enthusiasm	-.322 p=.024	-.311 p=.029
The rating on teacher classroom seatwork difficulty	.285 p=.041	.285 p=.041

TABLE 2., cont'd.:

VARIABLE	SPRSPRR	ADJGAINR
The rating on the degree of classroom attentiveness	-.353 p=.015	-.294 p=.037
The rating on teacher classroom distribution of time among students	-.256 p=.061	-.247 p=.067
The total number of private teacher initiated contacts	.223 p=.089	.204 p=.109
The total number of private child initiated contacts	.378 p=.010	.357 p=.014
The total number of dyadic contacts	.193 p=.123	.227 p=.086
The total number of private non-behavior related contacts	.306 p=.031	.285 p=.041
The total number of non-behavior related contacts	.207 p=.107	.244 p=.070
The total number of academic contacts	.182 p=.137	.242 p=.072
The total amount of time the observer is in the classroom	.330 p=.021	.365 p=.012
The proportion of all dyadic contacts that were private student initiated	.245 p=.070	.171 p=.152
The total number of opinion responses	.140 p=.202	.229 p=.083
The proportion of response opportunities that involved praise by the teacher	-.229 p=.090	-.301 p=.037
The proportion of response opportunities where the teacher rephrased the question or gave a clue	.234 p=.085	.166 p=.167
The proportion of response opportunities where the teacher asked another student to respond after the first student failed	-.320 p=.029	-.328 p=.026

TABLE 2., cont'd.:

VARIABLE	SPRSPRR	ADJGAINR
The proportion of all student questions or comments that were questions	.244 p=.075	.167 p=.165
The proportion of all student questions or comments that were comments	-.244 p=.075	-.167 p=.165
The proportion of all misbehaviors that were given a mild desist by the teacher	.388 p=.013	.393 p=.012
The proportion of all misbehaviors that were given a warning by the teacher	-.411 p=.009	-.315 p=.037
The proportion of all misbehaviors where the teacher made a timing error	.205 p=.126	.269 p=.065
The proportion of all private child initiated contacts where the teacher gave criticism	.307 p=.034	.328 p=.026

TABLE 3. READING - RELATIONSHIPS FOR 5th YEAR AND MIDDLE SCHOOL GRADES

VARIABLE	SPRSPRR	ADJGAINR
The total amount of individualized non-academic time	-.255 p=.110	-.323 p=.058
The total amount of whole group non-academic time	.252 p=.112	.294 p=.077
The rating on teacher classroom momentum	.427 p=.017	.474 p=.008
The rating on teacher classroom "withitness"	.466 p=.009	.525 p=.004
The rating on teacher classroom interruptions	-.306 p=.068	-.340 p=.048
The rating on teacher classroom seatwork difficulty	.361 p=.038	.425 p=.017
The rating on the degree of classroom attentiveness	.404 p=.023	.433 p=.015
The rating on teacher classroom distribution of time among students	.458 p=.011	.497 p=.006
The proportion of all dyadic contacts that were response opportunities	.332 p=.052	.318 p=.061
The proportion of response opportunities that involved criticism by the teacher	.355 p=.048	.236 p=.139
The proportion of response opportunities where the teacher rephrased the question or gave a clue	-.308 p=.076	-.270 p=.106

TABLE 3., cont'd.:

VARIABLE	SPRSPRR	ADJGAINR
The proportion of all student questions or comments that were questions	-.287 p=.103	-.335 p=.069
The proportion of all student questions or comments that were comments	.287 p=.103	.335 p=.069
The proportion of all misbehaviors where the teacher made a target error	.297 p=.102	.334 p=.075
The proportion of all misbehaviors where the teacher made a timing error	-.631 p=.001	-.653 p=.001
The proportion of all private teacher initiated contacts that were social	.327 p=.056	.279 p=.089
The proportion of all private child initiated contacts that were brief	-.310 p=.066	-.299 p=.073
The ratio of number of academic interactions per minute divided by the number of non-academic interactions per minute	.255 p=.110	.274 p=.093

TABLE 4. MATH - RELATIONSHIPS ACROSS ALL GRADES

VARIABLE	SPRSFRM	ADJGAINM
The total amount of small group academic time	.184 p=.087	.194 p=.076
The total number of minutes the teacher spent with small groups	.187 p=.084	.201 p=.069
The rating on teacher classroom "withitness"	-.209 p=.061	-.259 p=.027
The rating on teacher classroom movement	-.114 p=.202	-.230 p=.044
The rating on teacher classroom interruptions	-.234 p=.041	-.273 p=.021
The rating on teacher classroom enthusiasm	-.377 p=.002	-.389 p=.002
The rating on teacher classroom length of transitions	-.338 p=.008	-.345 p=.007
The rating on the degree of classroom attentiveness	-.151 p=.138	-.212 p=.062
The rating on teacher classroom distribution of time among students	-.332 p=.007	-.382 p=.002
Total response opportunities given by teacher	.197 p=.073	.232 p=.043
Total number of student initiated questions or comments	.240 p=.038	.176 p=.097
The total of mild and severe misbehaviors	.238 p=.039	.202 p=.068
The total number of dyadic contacts	.241 p=.039	.229 p=.048

TABEL 4., cont'd.

VARIABLE	SPRSPRM	ADJGAINM
The total number of non-behavior related public contacts	.216 p=.058	.222 p=.054
The total number of non-behavior related contacts	.232 p=.046	.220 p=.055
The proportion of all dyadic contacts that were student initiated	.265 p=.026	.188 p=.086
The proportion of all dyadic contacts that involved misbehaviors	.283 p=.019	.311 p=.011
The proportion of all dyadic contacts that were private student initiated	-.247 p=.036	-.253 p=.033
The total number of opinion responses	.233 p=.042	.226 p=.047
The proportion of response opportunites that involved praise by the teacher	-.243 p=.058	-.216 p=.082
The proportion of response opportunities where the teacher repeated the question	.397 p=.004	.464 p=.001
The proportion of response opportunities where the teacher asked another student to respond after the first student failed	-.211 p=.087	-.224 p=.074
The proportion of all misbehaviors that were given a mild desist by the teacher	-.232 p=.065	-.198 p=.079
The proportion of all private teacher initiated contacts that were brief	.219 p=.058	.189 p=.088
The proportion of all private teacher initiated contacts that were very long	-.149 p=.144	-.210 p=.066
The proportion of all private child initiated contacts that were social	-.250 p=.033	-.279 p=.020
The proportion of all private child initiated contacts that were procedural	.194 p=.078	.137 p=.159

TABLE 4., cont'd.:

VARIABLE	SPRSPRM	ADJGAINM
The proportion of all private child initiated contacts that were brief	.181 p=.093	.186 p=.087
The proportion of all private child initiated contacts that were very long	-.116 p=.200	-.219 p=.054

TABLE 5. MATH - RELATIONSHIPS FOR ELEMENTARY GRADES

VARIABLE	SPRSPRM	ADJGAINM
The total amount of elapsed time	.276 p=.049	.309 p=.032
The proportion of elapsed time that was academic	.127 p=.227	.245 p=.072
The proportion of all whole group time that was academic	.179 p=.191	.330 p=.050
The rating on teacher classroom "withitness"	-.285 p=.044	-.380 p=.010
The rating on teacher classroom movement	-.100 p=.278	-.256 p=.063
The rating on teacher classroom interruptions	-.238 p=.078	-.283 p=.045
The rating on teacher classroom enthusiasm	-.454 p=.002	-.504 p=.001
The rating on teacher classroom length of transitions	-.275 p=.061	-.266 p=.068
The rating on the degree of classroom attentiveness	-.181 p=.149	-.257 p=.068
The rating on teacher classroom distribution of time among students	-.402 p=.008	-.477 p=.002
The proportion of all dyadic contacts that were public and social or procedural and initiated by the teacher	-.241 p=.081	-.276 p=.054
The proportion of all dyadic contacts that were student initiated questions or comments	.233 p=.089	.146 p=.202

TABLE 5., cont'd.

VARIABLE	SPRSPRM	ADJGAINM
The proportion of all dyadic contacts that involved misbehaviors	.221 p=.101	.254 p=.071
The proportion of response opportunities that were answered incorrectly	.218 p=.132	.294 p=.064
The proportion of response opportunities where the student gave a "Don't Know" or no response	-.248 p=.101	-.373 p=.025
The proportion of response opportunities that involved praise by the teacher	-.318 p=.050	-.277 p=.077
The proportion of response opportunities where the teacher repeated the question	.529 p=.002	.620 p=.000
The proportion of all student questions or comments that were criticized by the teacher	-.106 p=.275	-.236 p=.090
The proportion of all misbehaviors that were given a mild desist by the teacher	-.313 p=.041	-.287 p=.056
The proportion of all private child initiated contacts that were social	-.313 p=.030	-.358 p=.015
The proportion of all private child initiated contacts that were procedural	.322 p=.026	.248 p=.069
The proportion of all private child initiated contacts that were very long	-.129 p=.224	-.246 p=.072
The ratio of number of academic interactions per minute divided by the number of non-academic interactions per minute	.121 p=.244	.222 p=.100

TABLE 6. MATH - RELATIONSHIPS FOR 5th YEAR AND MIDDLE SCHOOL GRADES

VARIABLE	SPRSPRM	ADJGAINM
The number of students per class	-.325 p=.088	-.439 p=.030
The total amount of elapsed time	.333 p=.082	.241 p=.160
The total number of minutes that were academic	.362 p=.064	.321 p=.090
The proportion of elapsed time that was academic	.395 p=.047	.267 p=.135
The proportion of all individualized time that was academic	.352 p=.076	.282 p=.128
The rating on teacher classroom enthusiasm	-.489 p=.017	-.404 p=.043
The total number of mild and severe misbehaviors	.324 p=.088	.295 p=.110
The total number of private teacher initiated contacts	.308 p=.100	.336 p=.080
The total amount of time observer is in the classroom	.327 p=.086	.293 p=.112
The total number of praises given by the teacher	-.573 p=.005	-.487 p=.017
The proportion of all dyadic contacts that were praise	-.609 p=.003	-.512 p=.012
The proportion of response opportunities that were answered correctly	-.347 p=.102	-.391 p=.075
The proportion of response opportunities where the student gave a "Don't Know" or no response	.405 p=.067	.439 p=.051

TABLE 6., cont'd.

VARIABLE	SPRSPRM	ADJGAINM
The proportion of response opportunities where the teacher asked another student to respond after the first student failed	-.568 p=.014	-.476 p=.037
The proportion of feedback given when the students were incorrect or did not respond	-.463 p=.055	-.588 p=.017
The proportion of all student questions or comments that were praised by the teacher	.207 p=.213	.349 p=.085
The proportion of all misbehaviors where the teacher overreacted	.398 p=.100	.413 p=.091
The proportion of all private teacher initiated contacts where the teacher gave praise	-.344 p=.081	-.222 p=.188
The proportion of all private teacher initiated contacts where the teacher gave criticism	.398 p=.051	.430 p=.038
The proportion of all private child initiated contacts where the teacher gave praise	-.474 p=.023	-.396 p=.052
The proportion of all private child initiated contacts where the teacher gave criticism	.397 p=.051	.427 p=.039

APPENDIX D

MEANS, STANDARD DEVIATIONS, AND N'S FOR ALL PROCESS MEASURES

TABLE I

MEANS AND STANDARD DEVIATIONS FOR ALL GRADES - READING

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES-- TOTAL

VARIABLE	CASES	MEAN	STD DEV
NSTU	63	7.3513	2.1071
ETTIME	63	35.2286	7.2616
IAC	63	43.2540	37.5508
INAC	63	4.7143	6.1812
SGAC	63	30.1111	26.8467
SGNAC	63	2.2857	2.9536
WGAC	63	14.2063	23.0757
WGNAC	63	3.6508	4.7013
TOTI	63	47.9683	41.2803
TOTSG	63	32.3968	28.7781
TOTWG	63	17.8571	25.2994
TOTIMEAC	63	87.5714	42.0992
TOTNAC	63	10.6508	7.7087
PROTIMAC	63	0.8916	0.0630
PROPACI	53	0.8567	0.2389
PROPACSG	46	0.9315	0.0605
PROPACWG	43	0.5896	0.3626
MORATE	63	3.6598	0.9532
WITHRATE	63	3.6684	0.9082
MOVERATE	63	2.7041	1.2256
INTRRATE	63	2.1367	0.9350
ENTHRATE	63	3.0681	0.9167
LNGTRATE	60	2.0318	1.0132
SFATRATE	63	2.3057	0.7838
EQUPRATE	63	2.6043	1.0212
QUESRATE	61	2.0762	0.8733
AIDERATE	62	3.7056	1.2695
ATTNRATE	63	4.1081	0.8316
DISTRATE	63	3.5521	0.9846
TOTRO	63	48.2222	48.2368
TOTPUBSP	63	17.8413	16.2185
TOTSI	63	25.6349	27.0706
TOTRR	63	7.5238	11.3803
TOTTAC	63	35.9365	29.7266
TOTCCC	63	26.1587	23.6167
TOTDYAD	63	161.3333	99.0577
TOTPUBNB	63	91.6984	77.8395
TOTPRINB	63	62.1111	51.3744
TOTNB	63	153.8095	93.2864
TOTAC	63	89.5397	64.3438
TOTTIME	63	98.2540	46.9076
TOTPRAIS	63	14.4921	15.0803
RATEDYAD	63	1.6827	0.7075
RATEAC	63	0.9375	0.5147
RATENAC	63	0.7552	0.3813
PROPAC	63	0.5347	0.1626
PROPPUB	63	0.5562	0.2838
PROPRI	63	0.4438	0.2838

TABLE I (CONT.)

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES- TOTAL

VARIABLE	CASES	MEAN	STD DEV
PROPRO	63	0.2779	0.2084
PROPURSP	63	0.1095	0.0884
PROPSI	63	0.1432	0.1019
PROPNR	63	0.0451	0.0513
PROPTAC	63	0.2451	0.1605
PROPCCC	63	0.1792	0.1334
PPRAIS	63	0.0862	0.0698
TOTOPIN	63	2.3968	6.5784
POPIN	59	0.0622	0.1556
PCORRECT	59	0.6786	0.1904
PINCORR	59	0.1776	0.1205
PLKNR	59	0.0817	0.1380
PPRAISRD	59	0.1492	0.1647
PCRITRD	59	0.0034	0.0141
PREFCLUE	59	0.0800	0.0971
PREP	59	0.0379	0.0444
PAU	59	0.0258	0.0206
PGIVEANS	59	0.0652	0.0660
PFDBK	56	0.8691	0.2720
PQSI	57	0.3642	0.1794
PCSI	57	0.6358	0.1794
PACC	57	0.9038	0.0883
PNACC	57	0.0962	0.0883
PACSI	57	0.3901	0.2555
PSPSI	57	0.6101	0.2556
PPRAISSI	57	0.0428	0.0751
PCRITSI	57	0.0111	0.0314
PHILD	53	0.9968	0.0199
PSEVERE	53	0.0032	0.0199
PMD	53	0.9348	0.1608
PRRN	53	0.0290	0.0736
PDA	53	0.0362	0.1448
PTARG	53	0.0109	0.0390
PTIMING	53	0.0350	0.1595
POVERR	53	0.0003	0.0019
PACTAC	61	0.4963	0.2202
PSOTAC	61	0.0616	0.0759
PPROTAC	61	0.4421	0.2245
PBETAC	61	0.4648	0.2009
PLGTAC	61	0.3475	0.1742
PVLGTAC	61	0.1843	0.1313
PPRAISTA	61	0.0867	0.0862
PCRITTAC	61	0.0124	0.0418
PACCCC	61	0.4593	0.2309
PSOCCC	61	0.0989	0.1701
PPROCCC	61	0.4417	0.2446
PBECCC	61	0.5935	0.2198
PLGCCC	61	0.2936	0.1969

TABLE I (CONT.)

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES- TOTAL

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	61	0.1087	0.1036
PPRAISCC	61	0.0972	0.1474
PCRITCCC	61	0.0022	0.0086
RATIO	63	1.5113	1.2188

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES-GR.1-4

VARIABLE	CASES	MEAN	STD DEV
NSTU	38	8.2016	1.8173
ETTIME	38	33.9237	5.9769
IAC	38	32.6053	35.0641
INAC	38	3.2895	4.6552
SGAC	38	33.9474	25.5903
SGNAC	38	2.5000	2.8735
WGAC	38	10.9474	17.4278
WGNAC	38	4.5000	5.3106
TOTI	38	35.8947	38.4720
TOTSG	38	36.4474	27.5570
TOTWG	38	15.4474	20.3824
TOTIMEAC	38	77.5000	41.8755
TOTNAC	38	10.2895	7.3812
PROTIMAC	38	0.8851	0.0510
PROPACI	38	0.8482	0.2598
PROPACSG	32	0.9388	0.0545
PROPACWG	27	0.4521	0.3686
MORATE	38	3.7221	0.9547
WITHRATE	38	3.6029	0.9647
MOVERATE	38	2.5645	1.2887
INTRRATE	38	2.1363	0.9275
ENTHRATE	38	2.9913	0.9024
LNGTRATE	37	2.0022	1.0236
SEATRATE	38	2.3663	0.7964
EQUPRATE	38	2.5982	1.0927
QUESRATE	36	1.7981	0.8047
AIDERATE	37	4.1819	0.8641
ATTNRATE	38	4.1413	0.8040
DISTRATE	38	3.4845	1.0705
TOTRO	38	55.1842	54.1394
TOTPUBSP	38	21.5526	17.4475
TOTSI	38	29.9211	29.8749
TOTBR	38	9.6842	13.9208
TOTTAC	38	35.0526	31.2643
TOTCCC	38	25.7895	26.2454
TOTDYAD	38	177.2105	110.3731
TOTPUBNB	38	106.6579	84.0223
TOTPRINB	38	60.8684	55.3437
TOTNB	38	167.5263	102.9095
TOTAC	38	97.9211	70.7414
TOTTIME	38	87.8158	47.7990
TOTPRAIS	38	17.4737	17.6172
RATEDYAD	38	1.9976	0.6496
RATEAC	38	1.0934	0.5122
RATENAC	38	0.9042	0.3818
PROPAC	38	0.5291	0.1573
PROPPUB	38	0.6095	0.2781
PROPRI	38	0.3905	0.2781

TABLE II (CONT.)

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES--GR.1-4

VARIABLE	CASES	MEAN	STD DEV
PROPRD	38	0.2892	0.1661
PROPURSP	38	0.1314	0.0996
PROPSI	38	0.1573	0.1078
PROPBR	38	0.0493	0.0469
PROPTAC	38	0.2177	0.1595
PROPCCC	38	0.1552	0.1274
PPRAIS	38	0.0964	0.0797
TUTUPIN	38	2.8158	7.9623
PUPIN	36	0.0812	0.1978
PCORRECT	36	0.6711	0.1778
PINCORR	36	0.1829	0.1276
PUKNR	36	0.0648	0.0621
PPRAISRD	36	0.1705	0.1611
PCRITRD	36	0.0053	0.0178
PREPCLUE	36	0.0844	0.0971
PREP	36	0.0365	0.0457
PAD	36	0.0225	0.0281
PGIVEANS	36	0.0685	0.0668
PFDBK	34	0.8626	0.2183
PQSI	36	0.3413	0.1621
PCSI	36	0.6587	0.1621
PACC	36	0.8862	0.0866
PNACC	36	0.1138	0.0866
PACSI	36	0.3745	0.2532
PSPSI	36	0.6259	0.2533
PPRAISSI	36	0.0393	0.0798
PCRITSI	36	0.0125	0.0325
PMILD	33	0.9892	0.0047
PSEVERE	33	0.0008	0.0047
PHD	33	0.0490	0.0979
PHRN	33	0.0318	0.0786
PDA	33	0.0192	0.0667
PTARG	33	0.0070	0.0350
PTIMING	33	0.0312	0.1740
POVERR	33	0.0004	0.0024
PACTAC	36	0.4975	0.2608
PSOTAC	36	0.0516	0.0637
PPROTAC	36	0.4509	0.2673
PBFTAC	36	0.5004	0.2386
PLGTAC	36	0.3377	0.2118
PVLGTAC	36	0.1570	0.1355
PPRAISTA	36	0.0989	0.0986
PCRITTAC	36	0.0152	0.0523
PACCCC	36	0.4616	0.2414
PSOCCC	36	0.1065	0.1974
PPROCCC	36	0.4319	0.2428
PBFCCC	36	0.6497	0.2289
PLGCCC	36	0.2551	0.2003

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES-GR.1-4

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	36	0.0880	0.0971
PPRAISCC	36	0.1090	0.1720
PCRITCCC	36	0.0037	0.0111
RATIO	30	1.4381	1.0957

TABLE III

MEANS AND STANDARD DEVIATIONS FOR GRADES 5-8 - READING

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES-GR.5-8

VARIABLE	CASES	MEAN	STD DEV
NSTU	25	6.0508	1.8689
ETTIME	25	37.2120	8.6278
IAC	25	59.4400	35.0827
INAC	25	6.8800	7.5626
SGAC	25	24.2000	20.1714
SGNAC	25	1.9600	3.1021
WGAC	25	19.1600	29.4104
WGNAC	25	2.3600	3.2772
TOTI	25	66.3200	39.2266
TOTSG	25	26.2400	30.0545
TOTWG	25	21.5200	31.4618
TOTIMEAC	25	102.8800	38.3464
TOTNAC	25	11.2000	8.3066
PROTIMAC	25	0.9016	0.0779
PROPACI	23	0.8678	0.2138
PROPACSG	16	0.9150	0.1222
PROPACWG	16	0.8217	0.2027
MURATE	25	3.5652	0.9625
WITHRATE	25	3.7680	0.8238
MOVERATE	25	2.9164	1.1146
INTRRATE	25	2.1372	0.9655
ENTRRATE	25	3.1848	0.9443
LNGTRATE	23	2.0796	1.0174
SCATRATE	25	2.2136	0.7712
EQUPRATE	25	2.6136	0.9236
QUESRATE	25	2.4768	0.8240
AIDERATE	25	3.0008	1.4523
ATTNRATE	25	4.0576	0.8863
DISTRATE	25	3.6548	0.8482
TOTRU	25	37.6400	30.0380
TOTPUBSP	25	12.2000	12.4599
TOTSI	25	19.1200	21.0680
TOTBR	25	4.2400	4.1461
TOTTAC	25	37.2800	27.7992
TOTCCC	25	26.7200	19.4519
TOTDYAD	25	137.2000	74.5708
TOTPUBNB	25	68.9600	62.2552
TOTPRINB	25	64.0000	45.7174
TOTNB	25	132.9600	73.5068
TOTAC	25	76.8000	51.9615
TOTTIME	25	114.1200	41.5505
TOTPRAIS	25	9.9600	8.5755
RATEDYAD	25	1.2204	0.5212
RATEAC	25	0.7005	0.4277
RATENAC	25	0.5268	0.2498
PROPAC	25	0.5432	0.1732
PROPPUB	25	0.4751	0.2782
PROPRI	25	0.5249	0.2782

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES-GR.5-8

VARIABLE	CASES	MEAN	STD DEV
PROPRO	25	0.2607	0.2249
PROPUBSP	25	0.0762	0.0544
PRUPSI	25	0.1220	0.0901
PROPBR	25	0.0386	0.0578
PRUPTAC	25	0.2869	0.1558
PROPCCC	25	0.2157	0.1366
PPRAIS	25	0.0706	0.0487
TOTOPIN	25	1.7600	3.6547
POPIN	23	0.0324	0.0561
PCURRECT	23	0.6902	0.2123
PINCORR	23	0.1693	0.1107
PUNR	23	0.1081	0.2070
PPRAISRO	23	0.1159	0.1683
PCRITRO	23	0.0005	0.0023
PREPCLUE	23	0.0730	0.0989
PREP	23	0.0400	0.0432
PAU	23	0.0309	0.0293
PGIVEANS	23	0.0601	0.0659
PFDBK	22	0.8792	0.3445
PQSI	21	0.4034	0.2039
PCSI	21	0.5966	0.2039
PACC	21	0.9340	0.0846
PNACC	21	0.0660	0.0846
PACSI	21	0.4169	0.2634
PSPSI	21	0.5831	0.2634
PPRAISSI	21	0.0468	0.0677
PCRITSI	21	0.0086	0.0300
PHILD	20	0.9929	0.0320
PSEVERE	20	0.0071	0.0320
PHU	20	0.9113	0.2317
PWRN	20	0.0244	0.0663
PDA	20	0.0643	0.2293
PTARG	20	0.0175	0.0451
PTIMING	20	0.0413	0.1363
POVERR	20	0.0	0.0
PACTAC	25	0.4947	0.1484
PSUTAC	25	0.0760	0.0801
PPROTAC	25	0.4293	0.1468
PBETAC	25	0.4135	0.1150
PLGTAC	25	0.3617	0.1003
PVLGTAC	25	0.2237	0.1163
PPRAISTA	25	0.0740	0.0636
PCRITTAC	25	0.0084	0.0185
PACCCC	25	0.4560	0.2198
PSUCCC	25	0.0801	0.1237
PPROCCC	25	0.4556	0.2516
PBFCCC	25	0.5125	0.1810
PLGCCC	25	0.3491	0.1816

TABLE III (CONT.)

MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON READING PROCESS VARIABLES--GR.5-8

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	25	0.1384	0.1072
PPRAISCC	25	0.0802	0.1034
PCRITCCC	25	0.0	0.0
RATIO	25	1.6226	1.4020

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES -- TOTAL

VARIABLE	CASES	MEAN	STD DEV
NSTU	56	6.8525	1.9077
ETTIME	56	32.0649	8.4782
IAC	56	48.5536	34.3574
INAC	56	3.9107	4.0194
SGAC	56	16.1250	19.3081
SGNAC	56	1.5093	2.4700
WGAC	56	9.8571	14.9355
WGNAC	56	2.2321	3.5777
TOTI	56	52.4643	37.0346
TOTSG	56	17.7143	20.5848
TOTWG	56	12.0893	15.8542
TOTIMEAC	56	74.5357	38.3282
TOTNAC	56	7.7321	4.9304
PROTIMAC	56	0.9033	0.0506
PROPAC1	52	0.9309	0.0568
PROPACSG	34	0.8303	0.2479
PROPACWG	39	0.5740	0.4458
MURATE	56	3.3825	0.9788
WITHRATE	56	3.4218	1.0476
MOVERATE	56	2.7237	1.1852
INTRRATE	56	1.8871	0.9119
ENTHRATE	56	2.9386	1.0768
LNGTRATE	56	1.7746	0.9078
SEATRATE	56	2.3707	0.8569
EQUPRATE	56	2.5852	1.1110
QUESRATE	56	1.5027	0.6597
AIDERATE	53	3.8632	1.3887
ATTNRATE	54	3.8689	1.0894
DISTRATE	54	3.3706	1.1112
TOTRO	56	27.1964	33.5865
TOTPUBSP	54	15.2222	19.4332
TOTS1	56	19.7500	21.7115
TOTBR	56	7.0179	8.4067
TOTTAC	56	39.3036	33.5905
TOTCCC	56	25.3571	21.7677
TOTDYAD	54	136.3148	92.4951
TOTPUBNB	54	63.2407	66.4808
TOTPRINB	56	64.6607	51.9074
TOTNB	54	129.0926	86.1504
TOTAC	56	70.8571	54.0022
TOTTIME	56	82.2500	41.6218
TOTPRAIS	56	12.3571	15.6361
RATEDYAD	54	1.6700	0.7721
RATEAC	56	0.8766	0.4717
RATENAC	54	0.7945	0.4497
PROPAC	54	0.5218	0.1490
PROPPUB	54	0.4472	0.2965
PROPRI	54	0.5528	0.2965

TABLE IV (CONT.)

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - TOTAL

VARIABLE	CASES	MEAN	STD DEV
PROPRO	54	0.1792	0.1653
PROPUHSP	54	0.1025	0.0925
PROPSI	54	0.1419	0.1254
PROPER	54	0.0491	0.0441
PROPTAC	54	0.3136	0.1761
PROPCCC	54	0.2138	0.1440
PPRAIS	54	0.0921	0.0810
TOTUPIN	56	0.6429	1.7728
POPIN	43	0.0228	0.0522
PCORRECT	43	0.6670	0.1928
PINCORR	43	0.2274	0.1537
PUKNR	43	0.0827	0.1683
PPRAISRO	43	0.1235	0.1570
PCRITRO	43	0.0031	0.0135
PREPCLUE	43	0.0954	0.0971
PREP	43	0.0689	0.0716
PAD	43	0.0233	0.0410
PGIVEANS	42	0.0513	0.0884
PFDBK	39	0.8221	0.2801
PQSI	51	0.3930	0.2106
PCSI	51	0.6070	0.2106
PACC	51	0.8463	0.1490
PNACC	51	0.1439	0.1421
PACSI	51	0.3261	0.2248
PSPSI	51	0.6723	0.2233
PPRAISSI	51	0.0518	0.1144
PCRITSI	51	0.0107	0.0305
PMILD	44	0.0813	0.0932
PSEVERE	44	0.0187	0.0932
PMD	44	0.9487	0.2178
PWRN	44	0.0344	0.0885
PDA	44	0.0396	0.1129
PTARG	44	0.0037	0.0144
PTIMING	44	0.0140	0.0532
POVERR	44	0.0020	0.0188
PACTAC	53	0.5534	0.2018
PSOTAC	53	0.0434	0.0659
PPROTAC	53	0.4032	0.1940
PBFTAC	53	0.4515	0.1744
PLGTAC	53	0.2960	0.1124
PVLGTAC	53	0.2475	0.1390
PPRAISTA	53	0.1146	0.1359
PCRITTAC	53	0.0083	0.0222
PACCCC	55	0.5416	0.2520
PSOCCC	55	0.0576	0.0788
PPROCCC	55	0.4008	0.2445
PBFCCC	55	0.5253	0.2282
PLGCCC	55	0.3143	0.1887

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - TOTAL

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	55	0.1587	0.1250
PPRAISCC	55	0.1172	0.1291
PCRITCCC	55	0.0049	0.0188
RATIO	54	1.3472	0.9650

TABLE V

MEANS AND STANDARD DEVIATIONS FOR GRADES 1-4 - MATH

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES -- GR.1-4

VARIABLE	CASES	MEAN	STD DEV
NSTU	37	7.4597	1.7882
ETTIME	37	30.0216	6.6795
IAC	37	40.5946	27.1666
INAC	37	3.2162	3.4330
SGAC	37	18.8378	20.6700
SGNAC	37	2.1081	2.8165
WGAC	37	8.3784	14.8499
WGNAC	37	2.3514	3.2422
TOTI	37	43.8108	29.5351
TOTSG	37	20.9459	22.1384
TOTWG	37	10.7297	15.6448
TOTIMEAC	37	67.8108	35.2269
TOTNAC	37	7.6757	4.4538
PROTIMAC	37	0.8950	0.0518
PROPACI	34	0.9330	0.0556
PROPACSG	26	0.0227	0.2620
PROPACWG	26	0.4832	0.4555
MIRATE	37	3.4419	1.0181
WITHRATE	37	3.4554	1.1627
MOVERATE	37	2.6511	1.2977
INTRRATE	37	1.8389	0.9017
ENTHRATE	37	3.0503	1.0669
LNGTRATE	33	1.5855	0.8833
SEATRATE	37	2.4865	0.9016
EQUPRATE	37	2.7665	1.0871
QUESRATE	37	1.4384	0.6452
AIDERATE	35	4.2049	1.1517
ATTNRATE	35	3.8674	1.2826
DISTRATE	35	3.3166	1.1887
TOTRD	37	32.7027	38.9200
TOTPUBSP	35	20.1429	22.2038
TOTSI	37	24.9730	24.1414
TOTHR	37	8.7297	9.3174
TOTTAC	37	40.8919	34.6905
TOTCCC	37	25.0270	22.4320
TOTDYAD	35	157.0571	102.5825
TOTPUBNB	35	80.0857	75.3460
TOTPRINB	37	65.9189	53.3715
TOTNB	35	147.9143	95.9057
TOTAC	37	78.6757	61.1110
TOTTIME	37	75.4324	38.8312
TOTPRAIS	37	15.9456	18.0308
RATEDYAD	35	1.9685	0.7304
RATEAC	37	0.9801	0.4754
RATENAC	35	0.9843	0.4378
PROPAC	35	0.4917	0.1503
PROPPUB	35	0.4969	0.2856
PROPRI	35	0.5031	0.2856

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES -- GR.1--4

VARIABLE	CASES	MEAN	STD DEV
PROPRO	35	0.1753	0.1512
PROPURSP	35	0.1234	0.0988
PROPSI	35	0.1670	0.1314
PROPRR	35	0.0579	0.0457
PROPTAC	35	0.2933	0.1748
PROPCCC	35	0.1831	0.1246
PPRAIS	35	0.1057	0.0876
TOTUPIN	37	0.8919	2.1185
POPIN	28	0.0260	0.0552
PCORRECT	28	0.6769	0.1603
PINCORR	28	0.2257	0.1549
PDKNR	28	0.0714	0.1045
PPRAISRO	28	0.1296	0.1529
PCRITRO	28	0.0047	0.0166
PREPCLUE	28	0.1046	0.0962
PREP	28	0.0734	0.0739
PAD	28	0.0219	0.0299
PGIVEANS	27	0.0476	0.0830
PFDBK	26	0.8428	0.2635
POSI	34	0.3553	0.1718
PCSI	34	0.6447	0.1718
PACC	34	0.8575	0.1259
PNACC	34	0.1425	0.1259
PACSI	34	0.3234	0.2224
PSPSI	34	0.6741	0.2201
PPRAISSI	34	0.0573	0.1264
PCRITSI	34	0.0160	0.0363
PHILD	32	1.0000	0.0
PSEVERE	32	0.0	0.0
PND	32	0.9759	0.2163
PWRN	32	0.0260	0.0564
PDA	32	0.0294	0.0926
PTARG	32	0.0051	0.0168
PTIMING	32	0.0078	0.0442
POVERR	32	0.0	0.0
PACTAC	35	0.5216	0.2093
PSUTAC	35	0.0385	0.0705
PPROTAC	35	0.4399	0.1899
PBFTAC	35	0.4867	0.1790
PLGTAC	35	0.2837	0.1100
PVLGTAC	35	0.2218	0.1352
PPRAISTA	35	0.1315	0.1411
PCRITTAC	35	0.0114	0.0265
PACCCC	37	0.5632	0.2796
PSOCCC	37	0.0623	0.0854
PPROCCC	37	0.3744	0.2623
PDFCCC	37	0.5362	0.2356
PLGCCC	37	0.3137	0.2119

TABLE V (CONT.)

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - GR.1-4

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	37	0.1480	0.1227
PPRAISCC	37	0.1406	0.1420
PCRITCCC	37	0.0063	0.0222
RATIO	35	1.1584	0.7364

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - GR.5-8

VARIABLE	CASES	MEAN	STD DEV
NSTU	19	5.6700	1.5782
ETTIME	19	36.0438	10.2523
IAC	19	64.0526	41.7978
INAC	19	5.2632	4.7824
SGAC	19	10.8421	15.4929
SGNAC	19	0.5789	1.0706
WGAC	19	12.7368	15.0770
WGNAC	19	2.0000	4.2426
TOTI	19	69.3158	44.6381
TOTSG	19	11.4211	15.8511
TOTWG	19	14.7368	16.3498
TOTIMEAC	19	87.6316	41.6283
TOTNAC	19	7.8421	5.8809
PROTIMAC	19	0.9195	0.0451
PROPACI	18	0.9271	0.0605
PROPACSG	8	0.8089	0.2020
PROPACWG	13	0.7556	0.3788
MORATE	19	3.2668	0.9125
WITHRATE	19	3.3563	0.8015
MOVERATE	19	2.8653	0.9445
INTRRATE	19	1.9421	0.9539
ENTHRATE	19	2.7211	1.0910
LNGTRATE	17	2.1418	0.8638
SLATRATE	18	2.1328	0.7223
EQUPRATE	19	2.2321	1.0995
QUESRATE	19	1.6279	0.6870
AIDERATE	18	3.1989	1.5932
ATTNRATE	19	3.8716	0.6223
DISTRATE	19	3.4700	0.9749
TOTRU	19	16.4737	15.2839
TOTPUBSP	19	6.1579	6.8497
TOTSI	19	9.5789	10.4632
TOTBR	19	3.6842	4.9559
TOTTAC	19	36.2105	32.0236
TOTCCC	19	26.0000	20.4947
TOTOYAD	19	98.1053	54.1048
TOTPUBNB	19	32.2105	26.6074
TOTPRINB	19	62.2105	50.2611
TOTNB	19	94.4211	50.2177
TOTAC	19	55.6316	32.7299
TOTTIMF	19	95.5263	44.6771
TOTPRAIS	19	5.3684	4.3360
RATEDYAD	19	1.1201	0.5051
RATEAC	19	0.6751	0.4038
RATENAC	19	0.4449	0.1853
PROPAC	19	0.5774	0.1329
PROPPUB	19	0.3556	0.3019
PROPRI	19	0.6444	0.3019

TABLE VI (CONT.)

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - GR.5-8

VARIABLE	CASES	MEAN	STD DEV
PROPRO	19	0.1864	0.1929
PROPURSP	19	0.0640	0.0658
PROPSI	19	0.0953	0.1007
PROPBK	19	0.0327	0.0368
PROPTAC	19	0.3511	0.1769
PROPCCC	19	0.2705	0.1627
PPRAIS	19	0.0672	0.0617
TOTOPIN	19	0.1579	0.5015
POPIN	15	0.0169	0.0471
PCORRECT	15	0.6485	0.2472
PINCORR	15	0.2307	0.1568
PDKNR	15	0.1039	0.2514
PPRAISRO	15	0.1121	0.1693
PCRITRO	15	0.0	0.0
PREPCLUE	15	0.0782	0.0998
PREP	15	0.0605	0.0687
PAN	15	0.0258	0.0576
PGIVEANS	15	0.0580	0.1000
PFDBK	13	0.7807	0.3178
PQSI	17	0.4685	0.2622
PCSI	17	0.5315	0.2622
PACC	17	0.8241	0.1895
PNACC	17	0.1465	0.1743
PACSI	17	0.3314	0.2365
PSPSI	17	0.6686	0.2365
PPRAISSI	17	0.0407	0.0881
PCRITSI	17	0.0	0.0
PMILD	12	0.9315	0.1739
PSEVERE	12	0.0684	0.1739
PHD	12	0.8763	0.2139
PWRN	12	0.0567	0.1446
PDA	12	0.0670	0.1568
PTARG	12	0.0	0.0
PTIMING	12	0.0306	0.0717
POVERR	12	0.0104	0.0361
PACTAC	18	0.6150	0.1756
PSOTAC	18	0.0530	0.0566
PPROTAC	18	0.3320	0.1867
PBFTAC	18	0.3831	0.1463
PLGTAC	18	0.3199	0.1162
PVLGTAC	18	0.2984	0.1356
PPRAISTA	18	0.0816	0.1222
PCRITTAC	18	0.0022	0.0066
PACCCC	18	0.4970	0.1820
PSOCCC	18	0.0480	0.0643
PPROCCC	18	0.4550	0.1988
PBFCCC	18	0.5027	0.2169
PLGCCC	18	0.3155	0.1343

MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES
MEANS AND STANDARD DEVIATIONS ON MATH PROCESS VARIABLES - GR.5-8

VARIABLE	CASES	MEAN	STD DEV
PVLGCCC	18	0.1807	0.1303
PPRAISCC	18	0.0691	0.0810
PCRITCCC	18	0.0019	0.0083
RATIO	18	1.6951	1.2330

APPENDIX E

CODING MANUAL FOR LOW INFERENCE, HIGH INFERENCE, AND TIME ALLOCATION INSTRUMENTS

A Manual Describing Coding Procedures and Definitions for the 1981-82 OCPS Title I Process Evaluation Study[1]

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March, 1982

[1]Conducted as part of the Oklahoma City Public Schools Title I evaluation effort during the Spring semester, 1982.

Preface and Acknowledgements

This document describes the procedures and gives operational definitions of coding measures used in the 1981-82 Oklahoma City Public Schools Title I Process Evaluation Study. The instruments have been developed (or, adapted from existing instruments) for the purpose of describing the classroom environment and the Title I teachers' instructional styles. The method involves going into the Title I classes (the Learning Centers in OCPS Title I schools) and observing teacher and student behavior (on three occasions, in this study); then, following the summary and analysis of the process data, it should be possible to relate the classroom process measures to student learning gains. Those relationships will suggest future prescriptions to Title I teachers concerning how they could teach in order to enhance their students' achievement gains.

A large study like this cannot occur without the support of many people. The Title I Evaluator would like first to acknowledge Mr. John Fink and Mr. Frank Raia for their invaluable assistance in collecting the process data. Ms. Particia Watson, the Director of the Planning, Research, and Evaluation Department, not only critiqued the proposed coding systems, but also has been willing to divert already strained resources to the Process Evaluation Study as needed. Dr. George Kimball, Ms. Maridyth McBee, and Ms. Janie Hall all contributed to the study, by helping collect data and/or by criticizing the proposed

coding procedures. The Title I Program administrators, namely Ms. Maree Tarver and Ms. Myrna Debose, have been very cooperative and helpful, as have the Title I teachers, who were kind enough to allow us into their classrooms. And, the Title I Evaluator very much appreciates the excellent work by Ms. Letha Woodruff in preparing this document on observational procedures. This study is truly a group effort.

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Coding Procedures and Definitions

Introduction

The purpose of this manual is to provide a common base of knowledge on coding practices and definitions for those persons who are to be involved in the 1981-82 OCPS Title I observational (Process Evaluation) study. We will be using several kinds of data collection methods in order to describe as fully and precisely as we can the processes occurring in Title I classrooms. The goal is to be as specific and operational as possible in defining the categories and scales which we will be using for data collection.

There are four broad types or classes of variables for which we will be recording data with the Title I evaluation coding system. The types of variables include: (1) low inference variables, (2) high inference variables, (3) time allocation variables, and (4) narrative or anecdotal records.

"Low inference" measurement procedures usually involve frequency counts of operationally or behaviorally-defined classroom activities. For example, the number of times the teacher initiates an interaction with an individual student is a low inference observational variable.

"High inference" observational measures are most often five or seven point rating scales which address broader, less operationally-defined variables. For example, a norm-

referenced rating of the teacher's enthusiasm would constitute a type of high inference variable.

Time allocation or time use data may be collected in a variety of ways; the procedures we will use will require the observer noting in a brief phrase or sentence the type of activity and the content of instruction, along with grouping patterns. This will allow us to go back through the data after the study has been completed and determine the percentage of time spent by each teacher in several different categories. Much research on teaching has indicated the importance of time allocation and time use in the classroom.

The last class or type of data to be collected in the present study is often referred to as narrative or descriptive data. For this "qualitative" data, the observer will note interesting or salient aspects of the classroom environment and activities on a "comments" section on the low inference coding sheet. The information recorded under such a section often provides a useful context for considering what the meaning of low or high inference codes are on a particular day.

Low Inference Coding and Dyadic Interactions

The basic methodology for low inference measurement in this study will rely on coding of dyadic teacher-student interactions[1]

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[1]The low inference system used in this study is an adapted version of the Brophy-Good Dyadic Interaction Analysis System.

By dyadic interactions, we are referring to interactions between the teacher and one student at a time. Therefore, interactions which involve the teacher and more than 1 student at a time will not be coded in this coding system. If the teacher is addressing the whole group or whole class, no codes will be made with the low inference system. And, no codes are recorded for student to student interactions. (We will get some information on the interactions of the teacher with the whole group or whole class through the time allocation variables which will indicate the percentage of time teachers spend with the whole group or whole class.)

Within the low inference coding sheet, there are several major categories of variables, which are further subdivided into specific coding variables. For example, we distinguish between "public" response opportunity interactions, in which the teacher asks a question publicly (of the whole group) and one child answers, and "private" teacher/student interactions, in which the teacher goes to an individual child (or has the child come to her) and interacts with that student privately on a one-to-one basis with no intention of providing information or instruction to any other student.

Furthermore, each of these major classes of variables (public vs. private) can be further subdivided into interactions which are teacher-initiated as opposed to student-initiated. Teacher-

initiated public interactions are the academically-related questions which are asked of a group of students in such a way that any of the students (or a pre-selected volunteer) may respond to the question. Public student-initiated interactions are those in which the student calls out a question or comment, usually on some topic which is under discussion at the time.

Teacher-afforded private contacts occur usually when the teacher is going around to individual students and checking on their work and giving feedback. Child-created private contacts most often occur when the teacher is at her desk and the children come to her when they are finished with their work and want to have it checked or turned in (can also be students raising their hands for help).

We will also distinguish between social (or personal-related) interactions and procedural interactions and academically-related interactions (within each of the larger catgegories). Another section of the coding system will record behavior-related interactions, including the severity of the behavior problem as well as the teacher's response to the student misbehavior. The following sections of the coding manual give specific operational definitions for each coding variable or category.

Public Response Opportunity Codes

All codes under this category should relate to public academic interactions between the teacher and his or her students. Under

.he Q column on the coding sheet, the first code will indicate the sex of the student responding to the teacher's question (m or f). The next set of columns refer to the type of response made by the student responding to the teachers question; C means the student responded correctly, I means the student responded incorrectly, and DK/NR indicates that student said that he or she did not know or made no response.

Under the teacher feedback categories, codes are made for praise (a plus sign), criticism (a minus sign), rephrase or clue, repeat of the question, ask other, and gives answer. Together these codes will form a "string" or "sentence" which should indicate: The sex of the student aswering the question, the nature of the student's response, and the type of feedback provided by the teacher following the student's response.

Student-Initiated Questions and Comments

Another section for coding public teacher/student interactions is the section for recording student-initiated questions and comments (the public response opportunity codes just described are for teacher initiated public academic questions.) Under the student-initiated questions and comments section, the first code indicates sex of student (m or f); the next code indicates whether the student asked a question or made a comment (Q vs. C).

The next codes under student-initiated questions and comments indicate whether the teacher accepted or did not accept (A vs. NA) the question or comment which was made by the student. The following

codes indicate the type of question or comment (academic vs. social/personal or procedural). And finally, there are columns for recording praise or criticism from the teacher following the student's comments or questions (praise recorded under the plus sign and criticism recorded under the minus sign).

Behavior-Related Interactions

The next set of operational definitions refer to behavior-related teacher-student interactions. The first decision under behavior-related interactions depends on the intensity of the behavior problem. An m or f, designating the sex of the student, is marked under the M or S (mild or severe) column under "Intensity" (INT).

The next set of codes refer to the type of action taken by the teacher. One of three columns should be checked here; MD stands for the mild desist (usually verbal), WRN stands for warning given by the teacher, and DA stands for direct action taken by the teacher.

The final set of codes in the behavior-related category refer to type of error (if any) made by the teacher. There are three types of error recorded: target errors, timing errors, and teacher overreactions.

Private Contacts: Teacher Afforded and Child Created

The last two major categories of teacher/student interactions addressed by this coding system both refer to private teacher/student contacts. Within the class of private teacher/

student interactions, we code teacher afforded (teacher-initiated) contacts and child created (student-initiated) contacts. Under the broad category of teacher afforded contacts, the first code refers to the nature of the content of the interaction (indicated by an M or F for the student's gender under the appropriate column). A code is made for either academic, social (personal), or procedural interactions. The next set of codes refer to the amount or length of teacher interaction with the student in the private contact situation: brief contacts vs. long contacts vs. very long contacts. The final two columns under the teacher afforded private contacts section record the teacher's use of praise or criticism (praise coded under the plus and criticism coded under the minus sign.)

The codes under the child created contacts section are the same as those under the teacher afforded contacts section. The only difference between teacher afforded private contacts and child created private contacts is whether the teacher goes to the student (usually at the student's desk), or the student comes to the teacher (or, the student signals the teacher to come to his or her desk). Under child created contacts, codes are made for academic vs. social or personal vs. procedural interactions; for brief vs. long vs. very long interactions; and for praise or criticism.

Lexicon of Low Inference Observational Codes

Response Opportunities: Public (group or class) academically-related questions from the teacher or the students.

(1) Q=the first designation that a response opportunity has occurred (student's sex is recorded as M or F).

(2) Resp (the type of student response):

C=correct (handled by the teacher as being correct)

I=incorrect, including partly correct responses. The teacher may say, "yes, you got part of the right, but...." or, "No, that's not right, what about....".

DK/NR=Students say "I don't know" or make no response at all. That is, no real attempt is made to answer the question.

(3) Feedback (the type of feedback given by the teacher):

+=teacher praise, such as "that's good" or "great, Billy". A statement like "that's right" could be coded as praise if it has the right affect with it (tone of voice, facial expression, hugs and pats, etc.)

-=teacher academic criticism, such as indicating disapproval of the student's work. It doesn't have to be severe criticism--e.g. "Billy, you're not doing your best" or "Susan, it sounds like you didn't do your homework". Behavior-related criticism is not coded in this category.

R/C=rephrase or clue; this code would be used if the teacher re-worded the question and directed it back to the same

student (usually the student would've answered wrong or only partly-right in the first place).

REP=the teacher repeats the question verbatim or nearly verbatim; the repeated question is directed back to the same child (if the question is only implicitly repeated, a code for repeat is still made).

AO=asks other; the teacher directs a repeated or rephrased question to another student (other than the one who just responded). Indicates that the original interaction is terminated.

Student-Initiated Questions and Comments (SIQ-SIC): Public (group or class, out loud) questions or comments from students to the teacher.

(1) S=the first indication that a student-initiated question or comment has occurred; student's sex recorded as M or F.

(2) Question or comment:

Q=If the student asked a question.

C=If the student made some comment.

(3) Acceptance of student-initiated question or comment:

A=accepted by the teacher (she nods, allows the child to finish, etc.)

NA=not accepted; teacher cuts the child off, does not let him/her make the comment or ask the question.

(4) Type of question or comment:

AC=academic (concerned with the content of the topic under discussion)

S-P=social/personal or procedure-related comment or question.

(5) +=teacher praise (same definition as under response opportunities).

-=teacher criticism (same as under response opportunities).

Behavior-Related Interactions: contacts between teacher and student concerning student behavior problems.

(1)INT: refers to the intensity of the student behavior problem (put M or F under correct column).

M=mild behavior problems; student is talking, is out of seat, is not listening to teacher.

S=Serious behavior problem; physical aggression between students, very loud talking (or yelling), behaviors that are disruptive to many other students in the class or group.

(2) Teacher Action: type of action taken by the teacher to stop the misbehavior.

MD=mild desist; teacher corrects the problem by simply telling the student to stop what he or she is doing (and does so in a calm tone of voice.)

WRN=warning; the teacher makes an explicit warning--e.g. "If you don't stop that, I'm going to have you go to the principal's office!"

DA=direct action; the teacher does more than simply tell the child to stop misbehaving or give a warning. The student may be moved to different seat, may be sent out of the room, or may be physically contacted because of the misbehavior (e.g., a good hard squeeze on the arm).

(3) ERR: Type of "error" made by the teacher, if any (as described by Jacob Kounin in his research).

TA=target error; the discipline was directed at a student who was <u>not</u> the primary cause of the disruption (e.g., Teacher looks up as Sue's chair falls over, she disciplines Sue without being aware that Johnny was the one responsible for the chair falling over).

TIM=tiring error; the teacher lets the misbehavior continue so long that it increases in severity and/or spreads to other students not originally involved (e.g. a paper-throwing incident between two students escalates into a whole class paper-throwing fiasco).

OVER=overreactions; teacher uses a relatively intense kind of action for a mild problem (perhaps, yelling at a student for simply being out of his or her seat).

<u>Private Teacher-Afforded Contacts</u> (TAC): Interactions between a teacher and a student with no intended benefit or any other student; initiated by <u>teacher</u>.

(1) Type: refers to the nature of the private, teacher-initiated interaction.

AC=academically-related contact (concerns the content or substance of the lesson).

SO=Social or personal private contact; e.g. the teacher asks the student about a basketball game or about someone in the student's family.

PROC=procedural interaction; the contact is dealing with instructions or directions, or with getting on the right page, or with getting the right book, or with the operation of a teaching machine etc. (<u>not</u> with content).

(2) Length: refers to length of interaction

BF=brief; only a word or short phrase.

LG=long; more than a word or phrase (e.g. 1 or 2 long sentences).

VLG=very long; <u>more than</u> about 30 seconds with one student

(3) Affective feedback: praise or criticism

+=praise (same definition as under Response Opportunities).

-=criticism (same definition as under Response Opportunities).

<u>Private Child-Created Contacts</u> (CCC): Interactions between teacher and student with no intended benefit for any other student; initiated by <u>student</u>.

The major and the sub-categories under private child-created contacts are the same as for private teacher-afforded contacts:

AC=academic

SO=social

PROC=procedural

(2) Length of contact:

BF=brief

LG=long

VLG=very long

(3) Type of Affective feedback;

+=praise

-=criticism

High Inference Coding

The kinds of information usually collected by use of high inference ratings scales are more global estimates of classroom climate or teaching behavior than the kind of information collected by low inference observational categories. By definition, high inference ratings are not as operationally-defined as are low inference categories. The idea is that the observer will make use of his or her judgement in assigning ratings (on a five point scale) to a particular teacher or classroom on the dimension being rated.

This admitted use of judgment in the observation process does not necessarily or automatically mean that the data are biased; rather, it indicates that the dimensions being estimated are more global and less discrete or behaviorally-definable than the dimensions which are included on a low inference observational system.

It is usually possible to take the high inference rating and break it down according to relatively specific behaviors which

are coded at the low or high end of the scale; for example, ratings of teachers' enthusiasm derive from specific observable behaviors such as the teacher's tone of voice, facial expressions, amount of teacher movement or animation, etc. Rather than collecting data on all of these separate measures and then combining them into an overall enthusiasm rating, however, what we will be doing is giving an overall rating of enthusiasm with these other factors or behaviors in mind.

Although upon first consideration it may appear that high inference data are less valid or reliable, research has shown that when time and resources only allow a few observations per teacher, it is possible to get data in high inference fashion that can be even more generalizable than some low inference measures. In conjunction with each high inference rating that observers make in our Title I study, we will be also completing a "confidence rating" for that scale. The confidence rating of low, medium, or high degree of confidence (in the high inference rating) may be used as a "weighting" variable in conjunction with the high inference ratings.

Although observers may feel uneasy at first when collecting high inference data, after a while, we expect that confidence levels should increase. In the remainder of this section, we will first discuss (in general terms) each high inference scale, and then give the five point scales, with specific definitions for points along each scale.

(1) Momentum: Momentum is a concept that resulted from Kounin's research in classroom management. The degree of momentum is indicated by the presence or absence of "slowdowns". Slowdowns are caused by the teacher overdwelling on a topic and/or by the teacher's presentation being too fragmented. By cohesive orientation toward whatever topic is being addressed, the teacher would be maintaining a high degree of momentum.

(2) Withitness: This is another concept resulting from the Kounin management research. Withitness is composed of two major components: awareness of student behavior problems and communication of that awareness to the students. Teachers who are high on withitness monitor the class frequently and let students know that she knows what is going on.

(3) Teacher Movement: This variable should represent the amount of teacher movement around the classroom or Learning Center. Teachers who stay seated at their desk through the whole period will be rated low on movement. Teachers who are continually up and moving around, monitoring students' progress, should receive high ratings on teacher movement.

(4) Degree of Interruptions: The amount of interruptions in a classroom will be indicated by an estimate of the percentage of times the teacher is taken away from his/her main tasks. For example, other teachers coming into the room or having to answer questions of an aide or having to go to a storeroom or cabinet to get materials in the middle of a lesson would all be counted as interruptions.

(5) Enthusiasm: The rating on enthusiasm will indicate the degree of teacher excitement or involvment in the lesson that he/she is presenting. High enthusiasm ratings will go to teachers who are very animated, who have smiles on their faces, who talk in high and low tones of voice, etc.

(6) Transition Length: The length of the transition from one activity to another will be rated according to an estimate of the amount of time it takes to end one activity, and develop and get children engaged in a new activity.

(7) Apparent Difficulty of Seatwork Materials: This rating will primarily reflect the apparent difficulty level of the seatwork material which the children are engaged in. Seatwork material that is too difficult will probably generate a lot of hand-raising and question-asking on the part of students. Material which is approximately the right difficulty level will be material which students can (and do) actively work on, without asking a large number of questions.

(8) Equipment/Materials Usage: This rating will reflect the degree to which the teacher makes use of materials (other than pencil-and-paper) or equipment in the Title I classroom. Classes in which there is heavy reliance on teaching machines, puzzles, audio-visual materials, tape recorders and slide projectors, etc. will receive high ratings; classes in which there is little or no use of these kinds of materials and equipment will receive low ratings on this "equipment usage" scale (equipment and materials

being anything other than pencil, paper, books, and workbooks).

(9) Low vs. Higher Order Questions: The cognitive level of the question will be indicated by this rating scale. Low level questions (sometimes called "convergent" questions) are those which require the student to give or know facts, definitions, or other "rote" learning kinds of outcomes. Higher order questions are those which require the student to analyze or evaluate or comprehend some material more so than the student could if he/she were operating simply on rote knowledge or definitions. Higher order questions are presumed to lead to what has been called "divergent" thinking, as opposed to convergent thinking.

(10) Aide Involvement: This rating scale will reflect the degree to which the aide is directly involved in the instruction of the children within the Title I classroom. A high rating on this scale would indicate an aide who does teach the children and essentially operates in about the same way as the teacher does in the classroom. A low rating on aide involvement will suggest that the aide is used for more activities such as arranging materials, coordinating movement of students, giving directions, etc. and is not primarily involved in direct instruction-giving to the students.

(11) Attentiveness: The attentiveness rating should reflect the overall degree of engagement of the Title I students with the material to be learned. Classes where most of the students are

talking, are out of their seats, etc. would get low ratings; classes where students are task-oriented and engaged would get high ratings.

(12) Distribution of the Teacher's Time: This rating should indicate the degree to which the teacher "spreads her time around" among the Title I students. Teachers who contact all students equally would get a high rating, while teaches who contact 1 or 2 students only (out of 8-10, for example) would get low ratings.

One high inference rating sheet will be filled out on each class after the observation is completed (and preferably, when the observer is out of the Title I teacher's classroom).

Definitions of High Inference Scales

(1) Momentum

1	2	3	4	5
a very high rate of slow-downs (1 or more every 10 min.)	a fairly high number of slow-downs (6-7)	a moderate number of slow-downs (3-5)	very few (1-2) slow-downs	no slow-downs observed (high momentum)

"Slow-downs" can be caused by the teacher overdwelling on a topic and/or by the presentation being too fragmented.

(2) Withitness

1	2	3	4	5
low		moderate		high

"Withitness" is composed of two sets of behaviors: teacher awareness of student behaviors and communication of that awareness to the students. Teachers who are high on this scale monitor student

behavior continuously and have students who know that she knows what's going on.

(3) Teacher Movement

1	2	3	4	5
low		moderate		high

A teacher with a '5" on this rating scale is moving around the room continuously, checking on students, arranging things, etc. A rating of '1" would be given if a teacher sat in one place for 90-100% of the time.

(4) Interruptions

1	2	3	4	5
low		moderate		high
0% interruptions	10-20% interruptions	30-40% interruptions	50-60% interruptions	60% or more interruptions

An interruption is any person (adult or child) impeding (largely stopping, even if momentarily) the teacher's progress through an activity; e.g. if the teacher conducted 3 activities in an hour and one was interrupted by having the teacher called from the room, the 1/3 (about 33%) would be coded with a three (3).

(5) Enthusiasm

1	2	3	4	5
low		moderate		high
monotone, little movement, expressionless, very lethargic		some voice variation, moves freely, smiles sometimes		great voice changes, very animated, appears vibrant, very energetic

(6) Length of Transition

1	2	3	4	5
very brief		moderate		high

Transitions are the periods of changeover from one activity to another. A "1" rating would indicate teachers who have very smooth transitions that take only a few seconds; a "5" would be appropriate for very lengthy transitions--2 to 4 minutes or more.

(7) Apparent Difficulty of Seatwork

1	2	3	4	5
appropriate (not too difficult at all)		somewhat too difficult		much too difficult

The apparent difficulty level should be inferred from the cues on how much help the students are requiring while engaged in seatwork; with no extra help needed (children engaged, no handraising), a "1" or "2" would be coded; with much difficulty (i.e. many questions from students), a "4" or "5" would be coded.

(8) Equipment/Materials Usage

1	2	3	4	5
Low		moderate		high
0	0-.20	.20-.40	.40-.60	>.60

By "equipment/materials" usage we are referring to the reliance on teaching machines, puzzles, calculators, audiovisual aids, etc. (any thing other than books and workbooks). See Appendix A for coding procedures for this variable.

(9) Low vs. higher-order questions

1	2	3	4	5
Higher order questions 0-10% of the time	10-20%	20-30%	30-40%	Higher order questions more than 40% of the time

Lower order questions are skill-related ("rote" learning) while higher order questions require more abstract reasoning, with analysis, synthesis, comprehension, etc.

(10) Aide Involvement

1	2	3	4	5
Low		moderate		high
Aide doesn't instruct, arranges materials, shows kids how to start				Aide is a 2nd teacher, instructs kids as much, and in the same areas as the teacher

(11) Attentiveness

1	2	3	4	5
Fewer than 20% of students attending most of the time		Less than 50 or 60% of students attending most of the time		More than about 80% of students attending most of the time

(12) Equality of Distribution of Teacher Time

1	2	3	4	5
Very unequal distribution (1 or 2 students get very long contacts		Moderately equal distribution (a couple or a few students are contacted somewhat more than the rest)		Very equal distribution (all students contacted about equally)

Confidence rating: Along with each 5-point rating, the observer should indicate:

1 = Little or no confidence in the high inference rating	2 = Some (a moderate amount) of confidence	3 = a high degree of confidence in the rating

Procedures for Time Use Measurement

The "Time Use" record is to be used to indicate the amount of time devoted to different activities and different grouping patterns. The research literature has consistently shown that the amount of time devoted to activities concerning academic topics can be a powerful predictor of the amount of student learning.

The sheet for recording time use has ID information at the top of the page which is to be filled cut at the beginning of the observation: the observer's initials, the teacher ID number, the school, data, grade and subject matter, and the N of students.

Then the observer enters the "start" time under the time column (the time that the observation begins--should agree with the start time at the top of the low inference sheet). Under "GRP Pattern", the observer puts a check under either "1", "SG", or "WG": "1" indicates that the students are working individually (e.g., on seatwork); "SG" means that the teacher is working with a small group-- that is, at least 2 students, but fewer than the whole group; "WG" means that the teacher is working with the whole group--all 6 or 8 or 10 students who are in the Title I Learning Center.

The space under "activity" on the Time Use Record is for a brief narrative account of the nature of the activity occurring in the Title I class. For example:

Time	GRP Pattern			Activity
	1	SG	WG	
9:05		✓		Teacher is with 3 of 7 students, working on sounding out the letters "oy" and "oi". Aide is with others on spelling.

or,

Time	GRP Pattern			Activity
	1	SG	WG	
1:15pm	✓			Kids are working on math workbooks on fractions (individually); Teacher and aide circulate and monitor.

The rule for making a new entry on the Time Use Record is to record a new time and grouping pattern and activity description whenever the grouping pattern or the nature of the activity

changes. So, a new entry would be made if the teacher broke the whole group up into 2 small groups or if the topic being addressed changed from phonics to spelling. With no new entries, we will assume that the last-noted grouping pattern and activity are still occurring.

APPENDIX A

An addendum to Coding Procedures: Changes in Low and High Inference Measures and Additional Coding Conventions and Procedures

Additional Coding Conventions and Procedures

This document constitutes an addendum to the coding manual previously distributed to persons observing in the Title I process evaluation study.

Conventions

(1) If you truly cannot decide between coding child "correct" answer or "incorrect" answer, use the "incorrect" answer code. This will keep the "correct" column clean and make it likely to represent the best estimate of definitely correct answers.

(2) If the observer is not able to decide whether a private contact was teacher afforded or child created, use the Child Created Contact section. This could occur if the observer noted a private interaction occurring, but had not seen whether the child called the teacher to him or the teacher went, on her own accord, to the child.

(3) If it is not possible to determine whether an interaction was academic or nonacademic, use the nonacademic (social, personal, or procedural) coding categories. In this way we can be sure that variables which are derived from academic interaction categories were definitely academically-related.

(4) We can code opinion questions under the "Response Opportunity" categories by simply leaving out the code for the correctness of the student response. For example, if the teacher asked the student "What do you think Billy should have done?" then there is an implication that there is no right answer;

therefore, we would consider this an opinion question and not make any check mark for correct or incorrect or don't know/no response (the teacher feedback categories could be coded).

(5) We have a new procedure (slightly more complicated) for filling out the high inference rating on equipment and materials used. The procedure is to multiply an estimate of the fraction of the students in the class who were using equipment by an estimate of the fraction of the time that those students were using the equipment. Then, the product of those two fractions would be used in the rating on five point scale. A "1" will indicate no equipment or materials used, a "2" will indicate a product greater than zero, but less than .20, a "3" for a product of the fractions between .20 and .40, and "4" for products between .40 and .60, and a rating of "5" for the products of fractions that are greater than .60 (½ of the students for ½ of the time = .25, or a rating of "3".)

(6) The "start" and "stop" times on the low inference sheet should reflect the beginning and ending times for each of the classes observed. For example, if the whole observation goes from 9:00a.m. to 10:15a.m., and the first class tops at 9:35, the first three coding sheets could all have start times and stop times listed as 9:00 and 9:35. The last four coding sheets could represent the time from 9:35 until 10:15. Therefore, start and stop times on the last four sheets would be from 9:35 to 10:15. When the data are grouped by observation, though, the start time on the first sheet and the stop time on the last sheet reflect the time of the whole observation (9:00 to 10:15 in the example given).

(7) It is possible to code teacher criticism based on non-verbal cues, although the great majority of those codes should be based on teacher verbalizations ("Sue, you can do better than that!"). Non-verbal criticism could be coded if the teacher visably grimmaced following the child's response, and, it is the observer's judgment that the teacher was intending to communicate criticism.

(8) If there was no chance to observe a set of behaviors that are to be rated with a high inferance scale, then leave the rating blank and write "N.D." (for no data) beside the scale. The "N.D." will tell us later that the scale wasn't skipped by accident. For example, if no transitions occurred in the class, then it makes no sense to rate length of transitions, so that particular rating scale would be left blank.

(9) We should code 1st or 2nd class on high inference sheets for those observations where we saw 2 classes during the hour. A check mark designation has been added in the upper right hand corner of the high inference sheet to indicate 1st or 2nd class.

(10) We have a rule about not coding lengthy oral recitations (however, if the teacher stops the child in the middle of the recitation and asks him a question, that would be coded). We do want to code the situation where the teacher has a list of words on the board (or, on flashcards, etc.) and children are being asked to read (or define, or make a plural for, etc.) the words. Those are discrete, definable response opportunities and should

be coded like any other questions from the teacher (they may be very fast paced, but otherwise they are the same as regular response opportunities).

Procedures

(1) Start a new low inference coding sheet when the classes change (in those schools where we are observing two classes per observation).

(2) Make sure that all the ID information is completely filled out at the top of all coding forms before putting those forms in the filing cabinet.

(3) Observers are to make only one code (check mark in one column) between double lines on the low inference coding sheet. Each new interaction is initially coded with "m" or "f" for sex of student (this rule holds in all major categories).

(4) Do not become upset if you notice that you have missed a few interactions while making some note under "comments", or changing pages, or changing pencils, etc. The kinds of proportion and rate variables that we will be using in the analysis will, to a large degree, take care of slight differences in volume of interactions recorded.

(5) In order to facilitate making any necessary changes in the observational data, try to always have a pencil to use when coding observations.

(6) It is a good idea to take a copy of the coding manual and procedures and related memos in your folder when you go into

classrooms to collect observational data. That might make it feasible to check on a coding definition that you were not sure of (during a lull in the activity).

(7) Always allow enough time to check in at the principal's office. Many schools have this as a rule; we should be doing it everywhere.

(8) If the sheet can be filled out without the teacher or aide looking over the observer's shoulder, go ahead and complete the high inference rating while you are in class. This should help the accuracy of the data, particularly where we are seeing 2 classes (and filling out 2 high inference forms) during one observation. This supercedes the rule about not taking high inference forms into the classroom.

(9) Observers should make sure that the Time Use Record grouping pattern codes are used (some observations during the first week had no codes under "GRP Pattern") with each entry. Also, in the future there should be two Time Use Records filled out in observations where we see 2 classes (If this hasn't been done up to this point, don't worry, because we should be able to divide up the one Time Use Record into separate sections for the two classes.)

OKLAHOMA CITY PUBLIC SCHOOLS
PLANNING, RESEARCH, AND EVALUATION

March 2, 1982

M E M O R A N D U M

IMPORTANT -- Read this!!

TO: Observers

FROM: John Crawford JC

RE: Changes in low and high Inference measures

Low Inference

We have added 2 codes for public interactions:

(1) A "GA" column has been added under Feedback (under response opportunities) to handle the situation where the teacher gives the answer when a child is wrong.

(2) We now have a stand-alone code for recording teacher initiated public social, personal, and procedural interactions. For example, while the teacher has all kids together in a group, she says "Billy, you start putting away the tape recorders, please." While this code is public, it does not connect with the response opportunity codes (that's why it's separate).

High Inference

The major change in the high inference system was to drop the last two scales that were supposed to address the nature of the curriculum/topic of the day. In place of the "Math Subst." and "Reading Subst." scales we will now be rating attentiveness ("ATTN") of students, and, for an estimate of how the teacher spreads her time across students, the equality of the distribution of the teacher's time will be rated. The scales are further defined below.

Attentiveness (#11, ATTN)

1	2	3	4	5
Fewer than 20% of students attending most of the time		Less than 50 or 60% of students attending most of the time		More than about 80% of students attending most of the time

Equality of Distribution of Teacher time (#12, Dist. Time)

1	2	3	4	5
Very unequal distribution (1 or 2 students get very long contacts)		Moderately equal distribution (a couple or a few students are contacted somewhat more than the rest)		very equal distribution (all students contacted about equally)

Please note the attached (amended) coding forms; as of today (3/2/82), please throw away any copies of the earlier versions of the forms. Thanks.

APPENDIX B

Copies of Forms used in Data Collection:
Low Inference, Time Use Record and
High Inference Forms

Observer_____ School_____ Grade_____ N of Students_____ Start Time_____ Page ____ of ____

Tchr #_____ Date_____ Subject_____ Stop Time_____

Response Opportunities

Q	Response			Feedback					
	C	I	DK/NR	+	-	R/C	REP	AO	GA

PUB
S-P

SIQ & SIC

Student Q or C			Accept		Acad		FB	
S	Q	C	A	NA	AC	S-P	+	-

S-R Interactions

Int		Act			Err		
M	S	MD	WRN	DA	TA	TIM	OVER

-208-

TAC

Type			Length			Aff FB	
AC	SO	PROC	BF	LG	VLG	+	-

CCC

Type			Length			Aff FB	
AC	SO	PROC	BF	LG	VLG	+	-

Comments (problems in coding, salient events, etc.):_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(use back if necessary)

Observer_____ School_____ Grade_____ N of students____

Tchr#_____ Date_____ Subj_____

Time Use Record

Time	Grp Pattern			Activity
	1	SG	WG	

Observer_____ School_____ Grade_____ Obs. in AM____ or PM____

Tchr#_____ Date_____ Subj._____ 1st class____ or 2nd____

High Inference Ratings

(1) Momentum	1 2 3 4 5 (low … high)	(1) Confidence: 1 2 3 (low … high)
(2) Withitness	1 2 3 4 5 (low … high)	(2) Confidence: 1 2 3 (low … high)
(3) T. Movement	1 2 3 4 5 (low … high)	(3) Confidence: 1 2 3 (low … high)
(4) Interruptions	1 2 3 4 5 (low … high)	(4) Confidence: 1 2 3 (low … high)
(5) Enthusiasm	1 2 3 4 5 (low … high)	(5) Confidence: 1 2 3 (low … high)
(6) Lngth Transitions	1 2 3 4 5 (low … high)	(6) Confidence: 1 2 3 (low … high)
(7) Seatwork Diff	1 2 3 4 5 (low … high)	(7) Confidence: 1 2 3 (low … high)
(8) Equip/matls use	1 2 3 4 5 (low … high)	(8) Confidence: 1 2 3 (low … high)
(9) Lo vs hi quest	1 2 3 4 5 (low … high)	(9) Confidence: 1 2 3 (low … high)
(10) Aide Involv	1 2 3 4 5 (low … high)	(10) Confidence: 1 2 3 (low … high)
(11) Attn	1 2 3 4 5 (low … high)	(11) Confidence: 1 2 3 (low … high)
(12) Dist. Time	1 2 3 4 5 (very unequal … very equal)	(12) Confidence: 1 2 3 (low … high)

Comments:

APPENDIX C

Narrative Descriptions of Title I Classes
(collected for decision-making concerning
coding variables and procedures)

Preliminary Observations - Crawford
2/19/82

10:35 - 7th Grade - Reading

Teacher explains that this is a team teaching approach. There are 4 adults working with about 14 kids. Has 5 kids working on phonics, spelling, etc. They are using puzzle-format exercises and teaching machines to do homynyms. Helps kids get started, then leaves them to work on their own. Three kids are in a separate room, listening to tapes, will have to (10:44) respond to questions on tape content later. Information seems to be provided largely by machines, teacher is handling procedures, operations, coordination of activities. Teacher says that they are in the process of training the kids to use the machines, materials, with the long-term goal (10:48) being able to turn kids loose with the materials for entirely self paced, individualized instruction.

10:50 - Student has problem with working electronic teaching machine, teacher assists (long private procedural interaction).

10:51 - Teacher rotates back to three kids working with tapes. One kid is given reading assignment, with comprehension questions to answer. Other kids in audio room move from tape to written/ reading exercises. Several academic, long private interactions.

10:55 - Teacher circulates back out to main room, checks on kids' progress, reads assignment sheet - more procedural interactions. Lengthy academic interaction on sentence structure, mild praise. A large percent of time is spend getting kids started - not too many student initiated interactions. Not any behavioral interactions. (Some percent of teacher time spent waiting on kids to get through).

11:00 - Other kids are involved in other activities (writing) in other parts of the room with the other teachers.

Note: Kids have some choice of activities. Teacher is selecting kids for stations where they haven't been before.

Some procedural interactions, some personal, a few academic contacts. Kids wait on Teacher to show them how to proceed. Teacher to other adult interactions relatively frequently on where kids go to next.

Teacher continues around various stations, checking on progress, who's stuck, etc.

Content: sentences, comic strip sequence, comprehension, homynyms, vocabulary, punctuation.

Another teacher points out that there is no heat in half the building. (This is a "temporary" or movable aluminum building).

Apparently kids come in for 55 minutes at a time, once per week.

The biggest problem with this team approach, from the process evaluation standpoint, is that the teachers all teach all the same kids, so there's no way to assign one batch of kid's scores to one teacher; one possible solution might be to aggregate teacher data to the "team" level and then "pretend" like they were just one teacher.

Preliminary Observations - Crawford
2/18/82

Start: 9:55

1st takes roll, has 9 kids (4th grade Reading). Begins by setting up assignment with kids, corrects 1-2 kids who are not paying attention. Tells "Lost and Found" story (actually directions for assignment)--they are supposed to pull facts from her story (listening skills) to write up as their "Lost and Found" advertisement. Her story is ~2 min. long. Questions: What are the most important facts? (Cannot use more than 10 words). Question from kids (their ideas on how to do this): two asked on content (teacher didn't really answer--said "you'll have to think about it.")

10:02 - Short transition (~1 min.) followed by breaking up into two groups of 4 and 5 kids each. Teacher and aide go back and forth from one group to the other. The group of 3 is the one working on the "Lost and Found" story. The others are working on individual answer/workbook sheets on questions having to do with comprehension of a story they've recently read.

10:06 - Lots of dyadic interactions (mostly on academic content, but some (~ 1/4→ 1/3) on procedure).

10:07.5 - Teacher takes one child from "Lost and Found" group aside to further explain the assignment. Aide is with group working on comprehension.

10:10 - Teacher rotates to comprehension group, pulls one kid out for lengthy private academic interaction. Other kids come to her during this time and she handles their requests/needs simultaneously. Kid calls out "finished" and the teacher tells him to bring work for her to check. She begins giving feedback within a minute of when he said "finished".

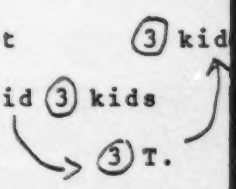
10:13 - Group working on comprehension questions breaks up. Now they begin to get started on "Lost and Found" project. Lots of academic student initiated interactions. Aide continues to work with one child from comprehension-question-answering group (but now on Lost and Found problem).

10:16 - Teacher handles procedural problems by referring to time contraints.

10:17 - Teacher begins asking questions to group of 6 kids (one child by himself, two with aide, 6 with Teacher) concerning Lost and Found ad problem.

10:19 - Use of praise by teacher (sounds genuine, contingent). Teacher directing academic - type questions to group of five (one child was separated out to work by himself). Teacher uses mild desists to kids talking out of turn and interrupting. Kids who are having trouble writing the Lost and Found ad get long, private interactions

10:21 - Teachers rotates to other kids. Teacher asks questions to kids designed to make them come up with the list of facts they should list on the Lost and Found ad. Most kids are not focusing on the right facts (size, color, etc.) but are thinking about what the hypothetical lost dog liked to eat, likes to do, etc.



10:26 - More praise; assignment continued tomorrow. Kids begin getting ready to leave. Procedural activities-straightening up, putting up materials.

10:28 - stop (kids gone)

Notes, Summary: I didn't see any major activities occurring that would not be recorded by a modified Brophy-Good Dyadic Interaction System, plus some high inference and time use variables.

Preliminary Observations - Crawford
2/19/82

8:45 - 5th grade Math

Seven kids come in. They sit at table near the blackboard. First, have one kid read instructions for today's assignment on the board--problem is related to going shopping--come up with lists, categories of items. Teacher is directing public (response opportunity) questions to kids. Rapid questioning, followed by kid answers, fairly high rate of praise.

8:50 - Kids come up with their grocery list, then go to stacks of newspapers and come up with prices for the objects they listed. Objective is to write down prices for items listed, add up the amounts by hand, and then check their work with a calculator.

8:53 - Kids begin working silently on making up lists, Teacher and aide go around to individual kids to help those who are stuck (lengthy private dyadic interactions). Some procedural requests from kids. Several kids also need help in selecting and going through the newspaper ads. Two of (8:56) the seven kids are separated out from the rest of the group-at individual tables/work areas. Teacher is spending up to 3-4 minutes with individual kids.

9:00.5 - Transition - they stop their work on the grocery list problem (not finished) and begin on individual workbooks. The kids are now over in the other half of the room all spread out. Most of them are at a table by themselves. One kid remains over in the side of the room where they started; he appears to be continuing to work on grocery list.

9:03 - Last kid moves over to other part of room. Aide is working with one kid on measurement (length of belt, neck circumference, etc.). Teacher goes around to individuals (one boy working with an abacus-looking thing). Some student initiated procedural req ests, not too many academic questions from kids--it appears that the workbooks are of appropriate difficulty, as all kids are engaged, and still there's not too much hand raising because of problems.

9:09.5 - Aide moves to another kid - Teacher pulls one boy from the workbook area and brings him over to audiovisual equipment and gets him started on some self-instructional tapes (headphones, screen, response system).

9:13 - Teacher goes back in the part of the room where kids are working individually. Praises, gives lengthy feedback. One child raises hand as signal he is finished--doesn't call out. Quiet, low key atmosphere.

9:14.5 - Aide tells kids to put away their materials - some brief social interactions. No behavioral interactions at all.

9:15 - Stop.

Note: Not too many interactions when individual seatwork was the task. Will need to pick that up by using engagement ratings.